

MAKING
SCIENCE

FUN

NEWTON'S ATTIC
HELPS FOSTER INTEREST
IN SCIENCE AND
ENGINEERING THROUGH
EXCITING HANDS-ON
PROJECTS, CLASSES,
AND SUMMER CAMPS

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Students explore the reaction between Diet Coke and Mentos at a Kiddie Chemistry camp.



T

here's a lot going on at Newton's Attic. So much, that it's hard to know which class or camp to take, especially if

you are a kid who is curious about science and serious about having fun.

In the wood shop over spring break, tweens and teens were making swords in the afternoons to engage in an end-of-the-week battle. And though it sounds like kids' play, it's not ... at least not in the traditional sense. Fashioning a wooden sword requires learning engineering-related skills such as balance, angular inertia, and momentum. And the battle itself calls for acquiring a few medieval sparring techniques, not to mention wearing the proper safety gear.

In another room, kids in third grade and up were sitting on the floor in the morning surrounded by colorful parts and pieces, putting together Lego robots and figuring out how to get them to do their bidding.

"I am learning how to program it to make the scoop go up and down. It's my best defense; otherwise, it's just a robot that can walk around," said 10-year-old Nick, who



Elementary student Taniya Taylor enjoys a ride on "G-Force."



Instructor Parker Owen and Nick Colon work on a "go-bot" that Nick built.

went on to explain excitedly how programming the scoop makes the robot more effective in waging battle, playing soccer, and going through mazes.

Newton's Attic is a playground for the mind, hands, and imagination. The privately funded nonprofit was founded in 1998 by former engineer and high school physics teacher Bill Cloyd after he grew frustrated over the confines of the classroom and the lack of resources. He wanted to stimulate interest in science, technology, engineering, and math (STEM) through exciting hands-on projects, classes, and summer camps.

After several years of taking Newton's Attic on the road to students, he and his wife, Dawn, opened a physical location at a former plant nursery on Old Versailles Road in 2012.

Dawn Cloyd, who is the director of community outreach and a former teacher, said enough parents had reached out to her husband about providing their children opportunities for hands-on science activities that he felt comfortable with the decision. Six years later, and relying primarily on word-of-mouth advertising and its website, Newton's Attic hosts an ever-changing array of weekly science camps that fill up all summer. Based on age, the camps run the gamut from teaching first- through third-graders computer coding to a sleepaway camp that simulates a spacecraft crash where participants, ninth grade and up, must solve problems using teamwork, engineering, and science skills. Camp prices range from \$195 to \$325 (half day) and \$390 to \$695 (full day).

During the academic year, schools from across the state visit on field trips and do hands-on activities that teach them about concepts such as force, velocity, and aerodynamics. The cost ranges from \$15 to \$20 per student, with a minimum \$350 per visit.

In addition, area schools utilize the nonprofit for classes and afterschool activities that require some extra space and resources,



Instructor Abram Gornik and Fletcher Sutton discuss building a rocket.



Founders Dawn and Bill Cloyd added "chief toy maker" Keith Hollifield, right, to the mix a few years ago. Hollifield is in charge of robots and is part of the creative force at Newton's Attic.



Students made a 3D Yoda from a donated robot that had helped deliver radiation to patients in its former life.

such as an engineering class from Dunbar's MSTC (Math, Science and Technology Center) program. Students build fighting robots that duke it out in a Plexiglas room-sized arena at Newton's Attic before a rather large crowd of classmates and parents.

And though the technology all sounds very alluring, Bill Cloyd believes more in the power of the basics — well, the engineer's basics: paper, pencil, wood, and steel.

"My goal is to teach kids to use tools so they can explore engineering by building things and seeing how they work," said Cloyd. "They learn the design process, how the parts need to go together, what the parts are made of, how they are going to function ... all those things.

"If they can conceive of something, then they'll have the knowledge of how to build it," continued the man who dreamed up the idea of an apparatus that can launch human beings into a lake and then spent two years building it. "That's why we are

so heavy on tools. A lot of kids come in not knowing which end of a screwdriver to use. We teach them to be proficient and efficient with the tools."

During spring break, students in the Maker Mania class were hard at work, putting together a wooden bowling game that Bill Cloyd had discovered online in a photo from a French newspaper the night before.

"I came in before class and made the parts," said instructor and facilities manager Joel Damron, a former vocational teacher who also had worked in manufacturing design for factory automation and who was leading the class. "It's that kind of challenge that keeps it fresh and interesting. I've really enjoyed this job more than I have enjoyed jobs in the past."

A project such as building the bowling game can be turned into a four-hour class, he said.

"We give them some pre-cut parts to size, but they do all the assembly and fin-



Alex Dyson, left, helps Marc Sultanov with his woodworking project.

ish work," said Damron. "They use the hand tools and the power tools to make it happen. We show them the workings of these items and where the dangerous parts are, and it's remarkable to me how responsible these children can be when given the opportunity and information they need to be safe."

It's an interesting juxtaposition to the technology, much of it donated or acquired through private grants, that Newton's Attic's also uses to teach. A decommissioned robot that delivered radiation to patients at Baptist Health Hospital in its previous life now spends its days being programmed to carve 3D objects like a Yoda from a wooden block or a race car from a chunk of high-density foam.

All the robots fall under the purview of Newton's Attic's newest partner, Keith Hollifield.

"Keith is also the one who figured out how to use the 3D printer that got donat-



A student takes a spin in a Spintron, modeled after NASA equipment.

ed to us,” said Dawn Cloyd, adding that he helps create new classes, runs the website, and, along with her husband, is a huge creative force.

The Cloyds met Hollifield two years ago when he brought his son to a Minecraft class at Newton’s Attic.

“Keith was waiting to start a drone business to survey property, but the FAA hadn’t gotten its regulatory act together, so we had him do an afterschool drone class that kept selling out and selling out,” said Dawn Cloyd. “And we really liked Keith. He is great with the kids, so we brought him on.”

Hollifield, who did risk assessment and owned a hobby shop for eight years before he sought a career in drones, said he found a kindred spirit in Bill Cloyd in their abilities to recognize a good base idea that can be extrapolated.

“We think, how can we do more, how do



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—BILL CLOYD

we make it more fun, how do we channel our inner 10-year-old and make it appeal to a kid?” he said. “Like instead of a seesaw ... how do we make that same mechanism launch something. And launching something is OK, but how do we make it

something big ... ”

“Like a person,” chimed in Dawn Cloyd.

What the Cloyds and Hollifield all want is for the students to be able to solve problems through science, math, and engineering while having fun.

“We don’t introduce the tools before the problem,” said Hollifield, talking about a class called Rocket Dragsters, where the students build rockets to power dragsters. “It requires getting a lot of proportions correct and working with percentages to get the chemical formulas right.

“I may let them fail a couple of times and then explain to them why [that proportion] just makes a smoke bomb and then give them more information to use. By the end of the five days, we have some kids who put these things [rocket dragsters] together, and they go 200 mph on a hundred-foot track.”

The technology at Newtown’s Attic also

FUN

Newton's Attic draws students from Kentucky and beyond.

includes the opportunity to explore the dimensions of virtual reality, allowing kids to take a trip among the planets or protect their castle with bows and arrows from invading marauders. And in a computer lab in the back, there are almost a dozen stations where kids can engage in educational computer games.

Over spring break the lab was full of kids, fifth grade and up, playing Kerbal Space Program. Instructor Abram Gornik described the computer game as a “rocket simulator where you run your own space agency and build rockets and pilot them around the solar system.”

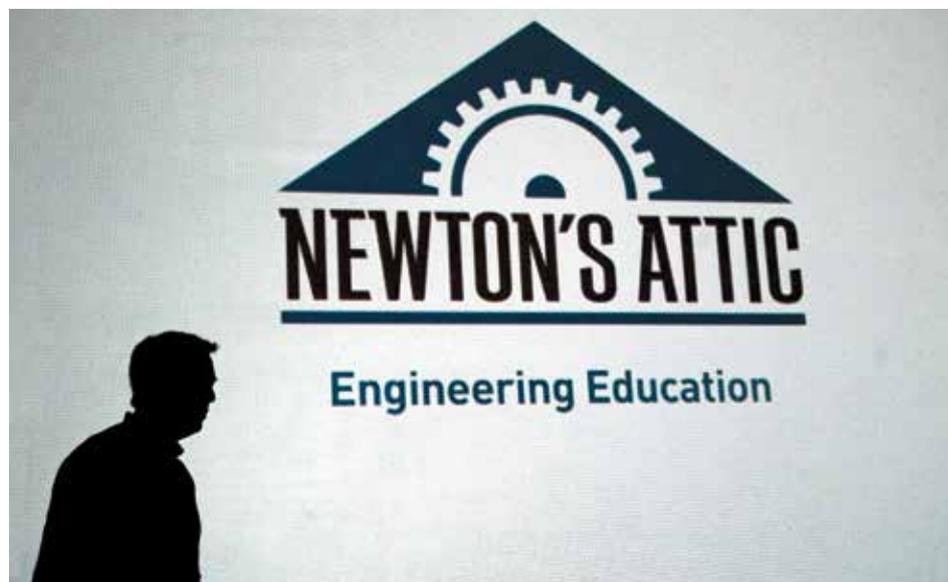
“It’s a simplified version, though, but it’s very faithful to the physics involved,” he said. “You have to learn physics to get anywhere; if you don’t figure things out, you won’t even be able to get off the planet.”

The game is very popular with actual rocket scientists. “JPL [Jet Propulsion Laboratories] had to send out a memo specifically asking that the game not be played on company time,” he said.

One of Gornik’s students, 11-year-old Fletcher, kept trying to launch a rocket to no avail. “This is making me crazy. It is so frustrating,” he said.

“You might want to check all your connections,” a very patient Gornik suggested. “There may be a fuel line somewhere that isn’t connected to anything. Sometimes that happens.”

Not all that goes on at Newton’s Attic is tools and technology. A group of young elementary schoolers in white lab coats and



goggles stood out front, a test tube of Mentos in one hand and a plastic bottle of Diet Coke in the other. As they took turns combining the two, the excitement of seeing the volcano-like eruption of brown bubbles never abated. And as a few kids thought the moment was right to take a swig, they also received a lesson on the health risks of drinking diet soda from their instructor Marlana Pressley, who teaches science at Tates Creek Middle School.

Newton’s Attic is well-staffed, with adult instructors, many of them science teachers or industry professionals, assisted by student interns, some of whom are often camp veterans. “We have a lot of teachers who work for us, especially during the summer,” Dawn Cloyd said. “We can’t pay a lot, but we still get many high-quality people.”

Damron said when he was hired, it was not his professional background that sealed the deal but his 4-H and youth soccer experience. Having a lot of knowledge is not enough, Dawn Cloyd said. The other requirements are an understanding of kids, a ton of patience, and the ability to make science fun.

And apparently it’s working. For most kids there over spring break, it didn’t seem to be their first rodeo, or, perhaps in Newton’s Attic’s terms, their first whirl in the Spintron (a multi-axis trainer Bill Cloyd built that is modeled after the one NASA uses to

simulate the disorientation astronauts feel during reentry into the Earth’s atmosphere, and a huge favorite with the kids).

Nine-year-old Ryann, from Cleveland, takes classes and camps when she visits Lexington on school breaks and during the summer. She said she loves Newton’s Attic because she gets to build things. As a little kid, she said she “always messed with things, touching them and taking them apart.” She recalled her mom’s annoyance at waking up to the noise of her removing door knobs or taking apart her grandfather’s crutches. Now, the self-proclaimed future engineer has not only the permission and encouragement to explore how things work but also the opportunity to build them.

“At first I didn’t like the drive to come here from Cleveland,” she said. “But now I count down the days until the road trip so I can come to Newton’s Attic.”

Bill Cloyd understands that kind of kid because he was that kind of kid.

“Since I was 6 years old, I just loved building things,” he said. “It was part of the DNA, I guess. I really love science and math, and how the different laws of physics all work together. One of the goals here is to show kids that all of the things they are learning in math and science class you can have fun with — if you know how to apply them in the right situations.” **KM**