NOW YOU'RE PLAYING WITH STEM POWER!
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*Cover: Matt and Liam having 16 bits of fun.*
WE ALL WIN

So there was this little football game played February 3. You may have watched it. Amidst four quarters of mostly punting (with a few field goals tossed in for good measure), we were all privy to that most holy of Super Bowl traditions: watching and evaluating the quality of the commercials.

I’ve heard mixed reactions to which advertisement was considered the big winner, but there was certainly one that stood out to me. It showed a group of kids doing what kids like to do: play video games. But here was the twist—some of these children had disabilities and thanks to engineering wizardry from the folks over at Microsoft, they were able to play along using a special adaptive controller for the Xbox One game console.

Now Microsoft certainly doesn’t need me as a pitchman for their products; by all accounts they have a tidy marketing budget. What moved me was how engineering and ingenuity came together to produce the magic of camaraderie and inclusion. When you mix in that secret sauce of “wanting to make a difference” with the core fundamentals of science, technology, engineering, and math (STEM), awesome things get accomplished.

Here at Crotched Mountain School, STEM is woven into our daily student experience. We have our Farm School program, where classes are able to absorb the wonder of biology up close and personal with our greenhouse and turkeys and chicken and sap-producing maple sugar bushes; we have art and music classes, both of which employ different technologies to open up worlds of creativity; we have a full-featured media center that allows students to dive into stimulating content (and catch the occasional movie in our little theater); and, of course, we have our world-class Speech, OT, PT, and Therapeutic Recreation departments, who use all manner of technology every day to assist students in their academic and daily living pursuits.

The stories that follow in these pages showcase these unique experiences. From the fun of science class to the latest in DIY tech, you’re going to see STEM come alive in new and exciting ways—as only Crotched Mountain School does it.

Thank you for helping make these experiences possible.

Michael Coughlin
President and CEO of Crotched Mountain

PS: About those Xbox adaptive controllers? One of our staff members started a fundraiser on his Facebook page and brought in enough money to buy two for Crotched Mountain School!
Geeking out is a universal constant. And Matt Jones is going to prove it.

There’s just something about Matt Jones’ room. Every class at Crotched Mountain School is thoroughly, gloriously unique, but spending a few moments in Matt’s enclave leaves you with one indelible take-away: this place is filled with some characters.

And that’s “character” in a good way; Matt’s group is made up of some absolute legends, students whose reputations precede them and whose present day successes will one day be etched into Crotched Mountain mythology.

Though every student is, of course, his own man, there are common traits that bind them together: 1) they are adolescent boys, some of the oldest at Crotched Mountain School, 2) they have a primary diagnosis of autism in conjunction with some communication and (occasional) behavioral challenges, and 3) they love movies and music and video games.

That’s where the similarities end and their personalities—and multimedia tastes—diverge:

LIAM, with his moppy blonde hair and legs the size of steel caissons, may be one of the strongest humans to ever set foot on Crotched Mountain. He has made enormous progress since first enrolling (when he arrived with a four-staff-to-one ratio); but when Liam gets to know you and, most importantly, gets to trust you, you won’t find a more affectionate guy, or a gentler giant, than him. A music lover, “Liam loves classic rock,” Matt says, “and he likes Justin Bieber’s newer stuff. He’s not a fan of his older stuff though.”

If it’s Star Wars-related, then COLIN is into it. When he’s not out in the community working at one of his jobs or racing down the ski slope with Crotched Mountain Accessible Recreation and Sports, he’s curling up with an iPad watching his favorite Jedi hjinks. “Canon, non-canonical, it doesn’t matter,”

Matt Jones unboxes the Pi
Matt says, “If there’s someone holding a lightsaber and using The Force, Colin is interested.”

KURT is a man almost in perpetual motion, but when the time calls for just kicking back, listening to music is his outlet. Good luck finding someone with more polar opposite tastes: “For Kurt, it’s either brand new Top 20 pop music or death metal,” Matt says. “It’s Adele or it’s Slayer and there’s nothing in between.”

For RYAN, causing mischief with (and often to) his pal Liam may be one of his favorite pursuits but taking in a movie is a strong runner-up. He is particular, however: 90s and early 2000s Disney movies are pretty much it for him. “He loves The Lion King,” Matt says. “Though lately he’s been into Dumbo.”

**CONTENT IS KING**

It’s Thursday and a nondescript package from Amazon just arrived. Matt sits at his desk and unboxes it. To the uninitiated, it looks like a cardboard receptacle of miscellaneous Radio Shack cast-offs—plastic, circuitry, wires, and more plastic.

But Matt’s eyes are lit up like road flares: the CanaKit Raspberry Pi 3 B-plus 16GB starter kit had finally arrived. For the layperson, a Raspberry Pi is an all-in-one multimedia device that can play movies, music, and retro video games, and sends the audio and video signal to a screen.

It’s the perfect addition to his classroom, a way to unify the digital entertainment each student tends to engage with solitarily and create a more communal approach to content consumption. And just as the endgame is for all the students to enjoy the new device together, they will they all contribute to the actual creation; its entry-level engineering the Crotched Mountain way and everyone’s getting a chance to bring this slick new tech to life.

Matt has a complete punchlist worked out, with specific tasks assigned to the boys in his class: from snapping together plastic pieces to formatting the SD card to hitting ENTER on the computer keyboard to trigger the operating system installation.

And just like that, the Raspberry Pi is fully-armed and operational. All that’s left is the content upload, when Obi-Wan and Mufasa join Tom Araya and Taylor Swift to find a new home with a legion of other avatars from the world of entertainment. Each byte of data represents a small slice of personality from a group of incredibly unique young men, all of it coming together into a brand new way for them to share in each other’s lives.

There’s only one more question left to answer—what to listen to first?

Probably Bieber.

But not the older stuff.
Science class at Crotched Mountain School is not a passive experience. There are no spectators. It's hands-on. It's messy. It's fun. And it’s for everyone.

Elliott Milford loads up his push cart with two cups of dirt. Well, that’s not entirely correct and, as the Crotched Mountain School science teacher, he would be the first to tell you—in the kind, yet authoritative, manner that seems hewn into the DNA of all science teachers—that one cup has sand and the other has soil.

This distinction is crucial, as the day’s lesson is all about learning the difference between sand and soil and grouping them all together under the “dirt” nomenclature is, frankly, frowned upon.

Science class is serious stuff at Crotched Mountain School and it doesn’t matter what a student’s diagnosis says—everyone gets to stick their hands in the soil and feel those earthen building blocks. And if some of it spills, so be it.

“The mess is irrelevant,” Elliott says. “Science at Crotched Mountain School is fun and hands-on.”

9:00 AM

Elliott’s first rendezvous is with Monica’s class. Because Monica’s students tend to have mobility challenges, he’s bringing class to them. When he arrives, Joe and Grace are sitting at the table waiting to dig into whatever gunky treasures Mr. Milford offers up.

The cart stops and Elliott deploys the day’s lessons—worksheets, science magazines, and the one cup each of sand and soil. He takes a seat and launches into a simple discussion of what grows in sand (spoiler: not much!) and what grows in soil. The students listen, eager to feel the dirt themselves. Elliott obliges and the cups get passed from student to student.

The hands dip in and Joe and Grace play with the contents; they compare the differences in texture and fineness, all while Elliott gives them the lowdown on concepts like seeds and roots and growth.

“My goal is to help them grasp these basic concepts,” he says. “In addition, we’re able to work on speech by articulating some of these new words. This one lesson is able to cover a lot of aspects of the learning experience.”

At 9:30, science class is over. Elliott bids farewell, packs up his cart, and heads back to his classroom.
Elliott passes the cup of dirt
What do carrots have a lot of? Vitamin A! And Vitamin A helps you see!

It is apparent that Elliott gets excited about Vitamin A and his enthusiasm immediately finds its way to the children seated around him.

One little boy picks up on the conversation and bellows out his own comment:

“It can help me have x-ray vision!”

It’s the afternoon and Elliott is surrounded by some of the younger students from Crotched Mountain School. Cognitively, it’s a much different group than his morning class and Elliott scales the lesson appropriately.

“We’re not only working on biology, but ecology too,” he says, as he passes that same cup of soil over to the children. They eagerly plunge their hands in. “We’re talking about the spring and soil and the change of weather and the right time to plant things.”

Carrots may be the veg of the day but it’s soon clear what’s generating the star power in today’s class: the grubs. Jessica empties a jar filled with Cheerios and grubs into her hand and the kids lean in to peer at the wriggling mass and ooh and ahh at the sight of the larvae. But that’s not even the cool part.

Because biology is about to get real.

“Who’s ready to feed the grubs to the turtle?” Elliott polls the class. The response is, of course, instantaneous and seismic. Hands shoots up in the air as if they were spring-loaded.

And with that, teacher, staff, and students gather their things and exit the classroom, grub jars in hand, hopped up on the thrill of science, about to make a solitary turtle very, very happy.
The drive to Crotched Mountain for my first assignment as a writing intern is punctuated by single-digit temperatures and streams of sunlight poking through the trees, brightening the snow banks that line the country roads. I’m fully caffeinated, excited, and curious to see how STEM is taught at Crotched Mountain School. The sun seems to have known what I was up to this day and shines on me accordingly.

After a brief meeting with my mentor, Dave, I’m escorted to a warm classroom where three students await the day’s lesson. The students are seated around a gathering of tables in the room’s center and each is focused on their individual interests as they await the start of class. Christian is announcing an upcoming weekend visit from his father; Grace explores a variety of food options she hopes to enjoy for lunch; Lacey converses with her staff, Miranda using the Touch Chat application on her iPad. Their teacher, Judy Beckman, calls out the countdown to 9:30—the end of break and beginning of their lesson—as this is, after all, a STEM class. Christian’s immediate response is “No math!” but he says it with a bemused grin that makes me chuckle.
Christian, Lacey, and Grace each have complex medical needs in addition to their cognitive differences. The three face sensory issues either related to vision, hearing, or both with Lacey and Grace also affected by neuromotor and communication deficits. Despite these challenges, all three children participate in STEM class today. In part, due to the unique design of the lesson plan.

Judy teaches the class with multiple tools, much the way I envision a public school class—but with a twist. As she speaks, she also signs the lesson for Lacey. She begins by announcing that the subject for today is solids vs liquids and that the theme is snow—a propos for this frigid January morning. She proceeds to read a large illustrated book entitled *Snow*, which explains how snow is made before it highlights the unique character of snowflakes. Judy moves on to explain that today’s activity will involve constructing snow forts for the snowmen she then distributes to each student. The goal for today: to build forts large enough to house the custom snowmen.

As she hands out the blueprint for the snow fort, Judy explains that each student will need to decide on the size and geometric shape of the base, the height and width of the fort, and then the number of blocks (marshmallows) needed to achieve their design goals. The Styrofoam snowmen are passed out and each student in his or her own way explores the rounded edges of the body and the pointy toothpick arms.

Because Christian is blind, his paraeducator, Elaine, wraps one of his hands around the snowman so that he may see it with his long, articulate fingers, something that evokes another broad grin. I then realize that I can’t see all the students’ expressions and reposition myself in the room to a better vantage point during the construction phase. I sit down, look up, and am immediately drawn into Grace’s big brown eyes as they rapidly interface with her communication device. I learn that the device is called a Tobii dynovoxi-12 with an Eye Gaze access and that it tracks her eye movements, making it possible for her to choose responses without touching the device itself. Grace lives with Rett Syndrome, a rare and progressive neurodevelopmental disorder that affects speech and motor function. In addition to making it possible for her to participate in the lesson, Eye Gaze allows Grace to communicate: “Give me space” or “I need a break”—both...
phrases she employs before class is over. Though Eye Gaze can read her choices, Grace enthusiastically taps the food images on her screen with her right hand before verbal cues from her Paraeducator, Christina, redirect her and she is once again engaged in the lesson. I marvel at the fact that each differently abled student can participate in the same lesson and later ask Judy how she makes this possible. She explains:

“Given the sensory deficits of several of the students (vision and hearing impairments) I try to make sure that I use a variety of materials and educational strategies so that all the students can access the activity. For example, we use materials that can be touched and have different temperatures and textures. We poured the water so that Christian could hear it, used sign language with Lacey, described the pictures in the book for Christian, and had edible materials for Grace because that is very motivating for her.”

Lacey is a study in patience as Miranda directs her hands first to her snowman and then to her communication device. The two will go back and forth throughout the lesson this way in what resembles a sublime and practiced waltz. While Christian has constructed a marshmallow skyscraper—a feat in sugar block engineering—Lacey’s methodical style and singular focus on her task have yielded a veritable fortress of marshmallow blocks that she delights in squishing her fingers into. Grace is the first to say she is finished and “needs some space” but she too has succeeded in constructing a snow fort that while not tall like Christian’s or as formidable as Lacey’s, is more than large enough to house her snowman.

In observing the three, I note their unique interpretations of the lesson. They may have needed support to remain focused, but they certainly have their own inclinations as to the design of their forts, and at what point each fort is complete. This is an important lesson for me as well—one of possibility. Judy reminds me:

When students have multiple disabilities, it’s sometimes hard for people to realize that they can do quite a bit on their own if provided with the right set-up. As you could see with Lacey, she was very attentive and involved in the activity despite having significant vision, hearing, and motor deficits. Today we talked about liquid and solid (a fairly high level concept) but one that can be represented with objects.

Three students with different challenges, but each succeeding through persistence, the ingenuity of their teacher, the guidance from their paraeducators, and invaluable technological devices they need for communication.
As the lesson nears its end, I learn that in addition to classes, Grace has a job that utilizes and helps strengthen her fine and gross motor skills—a job I’m told she does each time with a smile on her face. Today, the very sociable Christian will assist Grace, but he also has a recycling job at Monadnock Community Hospital and is currently saving his earnings for a spring trip to Canobie Lake Park in Salem, New Hampshire.

I will be driving back to Keene State College, my own school, shortly, returning along those same country roads feeling richer for the privilege of attending today’s class and meeting the people who provide the services that make the education possible. Crotched Mountain School is home to students as unique as the snowflakes that tumble from the sky here in New England.

Walking to the car, I experience a moment of blessed gratification. I wonder about my next adventure on The Mountain and then, while unlocking the car door, realize that I’m smiling.
THE FACE OF PHILANTHROPY

Transformational Technology

The $60,000 Digital Classroom Project has added valuable learning technology throughout Crotched Mountain School, augmenting the high-quality special education that takes place every day. The use of technology is not just an “add-on;” it is critical to the ability of Crotched Mountain students to communicate, acquire knowledge, and interact with peers and teachers.

Powered by grants and donations, this project has leveraged state-of-the-art technologies to enhance Crotched Mountain School. Using these funds, Crotched Mountain purchased computer-based and internet-connected SmartBoards, iPads, and other specialized tablets, all loaded with accessible learning features and software that address the individualized needs of students.

This digital revolution has been especially meaningful to students with communication challenges and physical impairments; more than half of the students at Crotched Mountain School now use assistive technology for expressive communication and for students with physical limitations in mobility. Assistive technology solutions have transformed their daily educational and residential experiences.

“We are deeply appreciative of the grants that have helped transform Crotched Mountain School through the Digital Classroom Project,” says Kevin Harte, Vice President of Advancement for Crotched Mountain Foundation. “With the combined support of many generous funders, our students learn better, communicate more clearly, and participate at a greater level in their own education.”

THANK YOU TO OUR FUNDERS

The Samuel P. Hunt Foundation awarded Crotched Mountain a matching grant of $30,000 for the Digital Classroom Project.

The Helen L. Kelly Trust Fund, sponsored by the New Hampshire Charitable Foundation, donated $7,000.

The McIninch Family Foundation awarded $10,000.

The Susan A. and Donald P. Babson Foundation donated $3,954.

The Crotched Mountain Foundation Board of Directors donated the last $9,046, to meet the $30,000 match challenge from the Samuel P. Hunt Foundation.
It’s November 14, and it’s standing-room only in the meeting chambers of the Governor of New Hampshire. Camera flashes light the room, and Governor Chris Sununu reads out a proclamation. Brook the Turkey has been pardoned from her Thanksgiving fate and staff and students from Crotched Mountain are there to bring the lucky bird back to Greenfield—where she is alive and well and happy to this day, being cared for at the Farm School.
The Boston Bruins Alumni faced off against the Crotched Mountain Wild for the ninth annual Bruins Alumni Classic, held on January 27 at Sullivan Arena in Manchester, NH. This year’s event was the largest yet, with over 400 attendees and over $40,000 raised. Proceeds from the Bruins Alumni Classic will support Crotched Mountain Accessible Recreation and Sports (CMARS).

Carter Hall falls silent as Elliott steps to the microphone to drop his rhymes while James “Scorpio” Andrews, stopping by Crotched Mountain School for another hip-hop-flavored musician-in-residence stint, cues up the backing track.

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Crotched Mountain School

A Learning and Life Experience Like No Other

For over 50 years, Crotched Mountain School has provided an unforgettable residential and special education experience surrounded by the natural beauty of New Hampshire.

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