

THE CIRCUIT

Baxter Academy for Technology and Science's monthly newsletter

The real world starts now.

January
2019

And the real world is right here.

It's down the street, at Fork Food Lab, where students are working their way through a commercial kitchen and learning how to modify recipes to meet dietary needs.

It's in the vacant lot off Elm Street, where students working with ACE Mentor have reimagined the Bayside Trailside Park to support Baxter's community and beyond. They've created designs incorporating indoor and outdoor spaces for recreation and innovation with food trucks to fuel the surrounding thinkers and makers. Seniors Samantha Palma and Dimitri Southworth received generous scholarships for their participation in the semester-long program.

And it's at University of New England, where students have spent the semester as lab research assistants developing an aquaponics system with tilapia and building out UNE's first Edible Wall. Also, at the Maine Medical Center Research Institute, students are working alongside cancer researchers, gaining experience in labs.

It's at D&G Machine where The Outliers FIRST Robotics team had the opportunity to submit designs of parts to be produced by D&G. The manufacturers typically produce parts for mills, power plants, and aerospace.

At Kettle Cove, one Baxter student is putting his recently acquired diving license to use. He has marked sections of the coastline and will be monitoring the invasive green crabs off-shore throughout the year.

But it's also right here at school. The real world is happening in our classrooms every day. Students are participating in a remote collaborative project with MIT students in their Physics department. They have continued the Cosmic Watch Project to develop detectors that track the coincidence mode movement of muon particles in space. Their final product is a computer simulation that will be available on MIT's website.

Students in the Flex Friday digital media cluster are working with their 'client,' the state of Maine Office of Workforce Innovations, to edit short videos the organization will use for promoting different careers in the government agency.



Students in Adam Gilman's American Studies course examined original letters, news articles, and other artifacts in the Maine Historical Society's Longfellow Library to complete research focused life in Maine between colonization and the Revolutionary War.

The CyberPatriot Flex Friday group spends its days working through IT security challenges sponsored by the Department of Homeland Security and designed by Cisco, leaders in anti-theft software and cyber security solutions.

All of this work could not be done without the keen curiosity of our staff and students, but it is enhanced tremendously by your support. Thank you for helping our students find themselves in the real world.



Laura Morris and Mei Strout - both 10th graders - collaborated to design a traveling Pop-Up Code workshop for middle school girls. Mei is pictured here (right), with Lily Callow (10th grade), Baxter parent Cindy Yuill, and Olivia Scola (12th grade). They are guiding students through a reflection on leadership qualities.

Serving a Side of STEM

FLEX
FRIDAY

What happens when young people are given the opportunity to explore science with their hands, rather than tablets and screens? This is the question at the root of Birch Knight and Ella Fontaine's Flex Friday project, a STEM curriculum-design internship with Karen Fream at East End Community School here in Portland.

Birch and Ella, both 10th graders, wanted to design a project that would not only be STEM-centered, but also community focused. Birch says coming from a lineage of educators inspired him to use Flex Friday as an opportunity to work with elementary school students. Ella also has a strong interest in mentoring younger kids; she currently volunteers regularly for her karate dojo. She saw this project as an opportunity to explore what a career in education might look like for her.

Ella and Birch connected with Karen Fream, Instructional Strategist for the East End Community School, last spring. Fream's two sons attend Baxter; she saw a partnership as a way to enhance her students' experiences in the every-growing makerspace in the EECS library. Fream has built out the makerspace to include everything from 3D printers to basic electronics materials to a green screen and costume bag. "It is wonderful to have students of high school age as role models for our students," Fream writes. "My students look up to them. Ella and Birch keep the activities interesting and relate well to their students."

Fream gave free reign of the TinkerDay curriculum to Ella and Birch, who began researching different science topics over the summer. At first, the options seemed endless, but, as in every design process, constraints began to guide their planning: "We only have a half hour with each group of students, so that really limits what you can do with 4th and 5th graders," Ella explains. They also needed to consider safety; though Birch was interested in connecting students to simple chemistry experiments, most projects weren't be feasible. And finally: they gave themselves a focus. "We decided to limit our lessons to hands-on activities." Ella asserts: "A lot of

people think that if you're doing STEM activities, you have to be using technology, which isn't true. So many jobs are about the mental work of thinking and problem-solving." Birch adds: "We also realized that the students get access to laptops and iPads in their classes. Lots of students don't get to learn with hands-on projects."

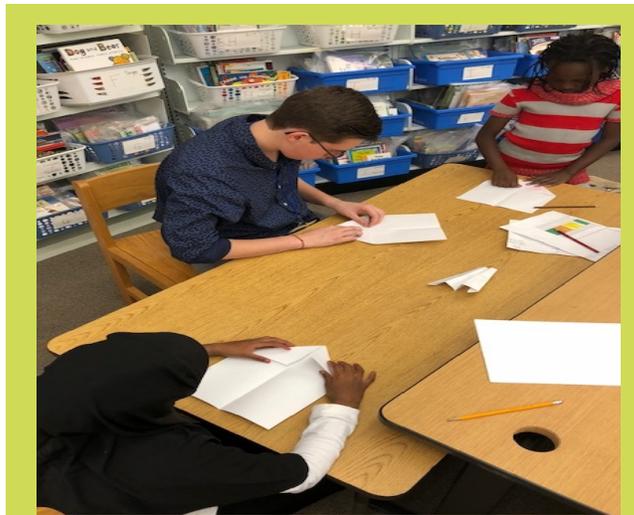
It is Ella and Birch's goal to offer a rotating series of STEM activities to 120 fourth and fifth graders at EECS. Every student is participating in the TinkerDay group by choice, during their lunch period.

In one session, they focus on paper airplanes. "It looks easy, but what actually makes a paper airplane fly?" Ella asks the group. Birch notes that they really want to give the students space to think and make predictions before getting to work. They first let the students create their own designs, and each student gets to work creasing and folding their paper. Then, Birch walks them through folding a second sheet of paper into a design that reinforces the wings and gives the plane optimal lift in the air.

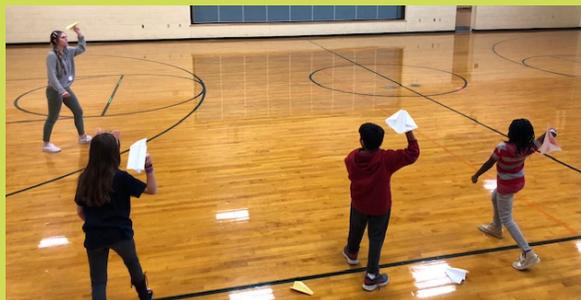
The kids are thrilled to test their airplanes in the school gym. They stand along the sideline marker as Ella counts them off. After each launch, they race to collect their planes and marvel at the distance traveled. Ella and Birch use these moments as opportunities to ask: Which planes flew better? Why?

Though there might not be time in each session to make all the connections Ella and Birch hope for, the students have one thing straight: Science is fun. "I wanted the chance to do a bunch of cool stuff," one fourth grader remarks.

"It's way better than recess," another chimes in. Just a third of the way through the year and Ella and Birch have met some key objectives: "This project means a lot to us because not only are we learning and growing ourselves, it's also helping to expand the STEM field into other school communities. We were driven to a project that helped other people, and not just ourselves."



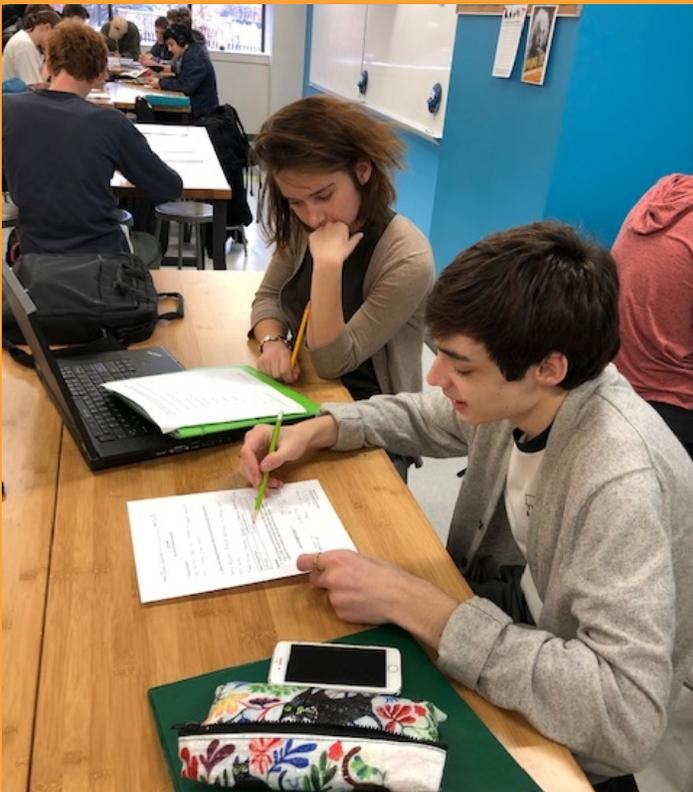
Birch Knight (above) and Ella Fontaine (below) spend their Fridays running TinkerDay at East End Community School in Portland.



Flex Friday dedicates 20 percent of the week to student-managed, long-term projects that are relevant to each student's interests and goals. Student teams identify a real-world problem, define how they might solve it, pitch their solution to a faculty review board, network with outside experts, and then set to work.

BEYOND the BUCKET: River and Stormwater Analysis

The science department at Baxter has worked to develop a scope and sequence of courses that supports our integrated approach to learning. No longer is biology taught in the vacuum of anatomy and physiology, but in context with chemistry, and even climate change. As the team developed courses that would integrate content with graduation targets, they continued to seek opportunities to overlap science standards in meaningful ways. Alaina Galvin's *River and Stormwater Analysis* course examines the learning standards of Climate Change, Matter & Energy, and Forces & Motion using the everyday element of water as an access point.



Norah Tafuri and Nick Caruso ponder the physics of water during class.

Alaina explains: "Water is a perfect tool. It's very applicable; students are familiar with the way water works. For example, they already know that it flows downhill. Now they can apply the laws of physics to that understanding."

Baxter Academy is a rigorous, college-preparatory high school promoting student ownership of learning through curriculum focused specifically on science, technology, engineering and math (STEM). Baxter Academy students study complex, real-world problems, using and building technological tools in a collaborative environment with scientists, engineers and other professionals.

Rather than using textbooks for reference, Alaina explains that her approach to helps students build context for themselves: "I've found that students gravitate toward tools that best support their individual learning style." She begins each unit with a list of vocabulary. Students are responsible for creating reference notes to use throughout labs, discussions, and other activities. Some kids will choose online videos, while others look for written definitions to help build their personalized reference guides. Allowing choice in how they access information will help them build research skills they'll utilize beyond high school courses.

In a recent lab, Alaina asks students to consider how the volume of water might affect its rate of flow. Five gallon buckets - each with a different sized hole in the bottom - are filled with water. Students first make predictions about how the rate of flow will change as the bucket empties. They then measure the volumetric flow rate in intervals of time to notice how the flow changes depending on the height of water. Alaina points out a key teaching strategy: "They innately know that the water will flow faster the greater the volume, but they don't know why." This basic understanding is Alaina's entrypoint into the discussion about flow rate. When students translate this data to graphs and create trendlines, they begin to notice the relationship between flow and the height of the water column in this visual representation.

As students begin to compare one another's charts, more lessons unfold. Alaina uses this lab to help students examine their data collection process: "It becomes immediate feedback on data collection. They start to notice sources of error that can occur in lab work and they are asked to reflect on those errors. It's also an opportunity to identify assumptions that are made when we are beginning to understand a concept." Students begin to understand the importance of acknowledging assumptions when examining a problem through the scientific lens.

Beyond the bucket, students are asked to apply these concepts to the world around them. One student observes: "I think it's interesting... I never thought much about the man made pond in our backyard, but it makes sense that it's there. Otherwise, the water would eventually collect and make its way to our basement."

This is exactly what Alaina hoped for students in this course: "They can start to see examples of forces working in everyday life: erosion, weathering of materials, etc. No matter what they continue to study, students will be able to use principles from this course."

LEARN
BY DOING

YOUR STORIES

Alumni Correspondence

What have you started, led, joined, built, fixed since graduating from Baxter?



I never thought I would be joining the military, but when I heard that I had a chance at a full scholarship for the degree I wanted, I gave

(AFROTC) and worked hard and eventually got the scholarship, and since then, my views have shifted significantly about the military and the Air Force specifically. We are being taught leadership skills and professionalism. We are getting briefed on our health, our wellbeing, and our financial futures. Of course, there is the physical aspect, which has been a great motivator, but also met with an equal importance on comradery and what we call “wingmanship”. Graduating the program, each cadet will serve at least four years in the Air Force (they can choose to do more) but after that, depending on your degree, many will go off into the private sector and engineer classified technology for the military or, with the leadership skills they gained in the Air Force, become a project manager or more. Paying for your education in the United States is becoming an increasingly tall order and I'm sure some, if not most of the current students are starting to feel that burden. I'm not saying go and join the military because it's not for everyone, but it is important to look at all your financial options going into school.

it a go. I joined the Air Force Reserve Officer Training Corps

How have you brought your experience as a learner at Baxter to your current community?

I am grateful for all the job shadows, presentations, field trips, and all of the other times I have gained professional experience through my time at Baxter. It's always a good feeling to get complimented about how mature and professional you are. I have found myself in plenty of situations using these skills while volunteering at guest speaker lectures for the plastics department, or in ROTC.

What advice can you give current Baxter students?

If there is one thing I can advise to Baxter students, it would be to start to figure out yourself as a learner. Mr. Amory has an amazing TEDx Talk about “learning how to learn” that I highly recommend to everyone. He makes a ton of good

Demetre Fontaine, 2017

Currently: University of Massachusetts, Lowell

Studying Plastics Engineering,

Air Force Reserve Officer Training Corps

points edging students in the direction of independent learning and open-ended problem solving through autonomy, mastery and purpose. Continuing your education beyond high school is all about you as an individual. YOU need to be the one to manage your time and school work effectively, YOU need to be the one to be motivated in your group projects and YOU need to find the passion that drives you.

Which Baxter course do you still think about? Why?

While I still think about my CAD, advanced engineering and advanced algebra classes, I am finding myself think more and more about my Flex Friday projects. Baxter really is an incredible learning environment. We have resources and knowledge that no public school could provide, and the faculty/staff doesn't hide any of it. In fact, they encourage students to get involved in their own learning and their communities through their Flex Friday projects. Back to Mr. Amory's TEDx talk about his career and visions for the school, it's not learning how to factor radicals that has made me successful in college, it's the work ethic, time management and self-taught learning strategies that have brought me to where I am. I can tell you right now that I am not the “smartest” person in any of my classes but having the assurance that I can be successful in any aspect of my life is worth more than a high SAT score.

Reach out and share your news:

email heather.dippolito@baxter-academy.org