By Emily May

Title
Instructor and Curriculum Developer for
Adventures in Engineering and Rocket Science

Organization
Digital Media Academy

Age Levels
7-12

LittleBits Products Used
Deluxe Kits + additional modules

Date
December 2014
BACKGROUND: DIGITAL MEDIA ACADEMY

Founded in 2002 at Stanford University by Stanford technology experts, the Digital Media Academy (DMA) is a world class tech camp that gives its students the opportunity to engage in a wide variety of digital media topics. From photography to filmmaking, programming to robotics, DMA’s #1 priority is the growth of the student as a maker, creator, innovator, and person who is fully equipped to handle any challenge that may come as our world adapts and changes to new technology. DMA operates technology camps at prestigious universities across the U.S. and Canada.

In addition to its summer camp programs, DMA provides on-site training to companies and educational institutions and offers workshops throughout the year at its training facility and corporate offices in Los Gatos, California. DMA’s instructors include nationally known industry experts and award-winning creative professionals.

You can read more about DMA here: https://www.digitalmediaacademy.org

BIO: EMILY MAY

I graduated in 2011 from the University of Montana in political science and immediately found my way to teaching through Teach for America. Since that time, I have worked in a variety of schools as an inclusion specialist teaching everything from foundational reading skills to algebra.

Two summers ago, I joined the DMA team as an Adventures Instructor. I’ve continued to come back to the organization because they’re constantly adapting and innovating. They really help kids leverage their strengths and ideas to make, build or do something that’s truly a reflection of their interests.
Adventures in Engineering and Rocket Science is a three part exploration into three different engineering fields: structural design, electrical engineering, and space flight. It is delivered over the course of a week and during that time campers explore each field through career research, project-based discovery, and lessons about the science behind electronics, architecture, and rockets.

Our week begins with a full day of electrical engineering with littleBits. Kids start the day with free exploration of their kits, working in small groups to discover how a circuit must go together to power an output. They build proficiency with the kits as they work to complete a series of objective-based “challenge cards” and, later, build an electronic game. The day ends with an “inventor’s hour” when student engineering teams design and construct a drawing machine.

Later in the week they revisit electrical engineering and littleBits on Challenge Day. This day allows them to utilize their new skills in each engineering subject to build machines that meet a specific demand. In the case of littleBits, they get access to a new tool (light sensors) that they must use to construct a line follower.

Explain how you incorporated littleBits into your program?

“The day ends with an "inventor's hour" when student engineering teams design and construct a drawing machine.”
WHO WERE THE KEY PEOPLE IN YOUR ORGANIZATION THAT MADE THIS PROJECT POSSIBLE?

Tricia George, Curriculum Developer
Emily May, Curriculum Developer
Marcus Duvoisin, Assistant Director of Curriculum and Development

WHAT WORKED WELL?

Our best successes come from open-ended projects that allow kids to design their own solutions to a problem we present (e.g., designing a drawing machine, working to complete challenge cards). These activities encourage kids to think about the utility of each part of a circuit and work with what they have, both in and out of the kit, to achieve their objective. There can be lots of competing ideas during these processes, but it allows them to practice the ever-important skills of compromise and redesign. In these cases, products are always diverse and kids really appreciate the chance to see everyone else’s ideas.

A Students create art bots to meet engineering design challenges.

B Other construction materials are incorporated into the design of the robots.
Out of the 150 students who went through the course and filled out a survey, there was an average rating of 4.4 out of 5 when asked specifically about the material inside the course.

Fridays are a time when parents come to the camp and see what their students have been learning all week. During this time, parents mentioned that their child has expressed interest in learning more about littleBits after camp.

WHAT WAS A CHALLENGE?

Broken pieces are one of the biggest challenges we’ve encountered. The modules are well-built, but delicate. We give instructions about properly using the materials which helps, but a few things seem to break more consistently than others (e.g., screwdrivers and things with wires leaving the body of the module, like fan bits).

We’d also love to see a kit that includes wheels that are directly compatible with the motor mate. Or, if we’re really dreaming big, an adaptor that allows two wheels and an axle to be attached to one DC motor. Campers designed a lot of wheel-based machines and we ended up borrowing wheels from Lego Robotics kits, but it would be awesome if they were included.

WHAT HAS BEEN THE RESPONSE OF YOUR STUDENTS/COMMUNITY?

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As we move into our second year working with littleBits as a camp, I am excited about the potential of designing our own projects to contribute to the knowledge base. The idea of providing students with open challenges with uncertain answers, challenges that are driven by the engineering design process and their interests, rather than a single outcome, will guide us as we begin this work. Additionally, we are looking to include littleBits into another one of our Adventures courses. This course will be solely focused on Electrical Engineering and would be paired with Arduino. We will send details as soon as they are developed :)

It is important to help kids make an explicit connection between littleBits and the other ways people make and interact with circuits. This expands their ideas about how littleBits can be used and allows them to dream up lots of potential uses for circuits. It can help them see the modules not only as fun toys, but tools they can integrate into functional machines. With this in mind, children, particularly in settings that serve a variety of ages, come in with different levels of understanding of electricity. I found it most helpful to preface littleBits exploration with direct instruction in electricity.

**WHAT ARE YOUR FUTURE PLANS FOR LITTLEBITS USE?**

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