

EDUCATION

littleBits™

LITTLEBITS EDUCATION COMMUNITY CASE STUDY

SCHOOL CLASSROOM

BY

Michael Wilkinson

TITLE

Math & Science Teacher

ORGANIZATION

Fieldston Ethical Culture, Lower School
Bronx, NY

AGE LEVELS

3rd Grade

LITTLEBITS PRODUCTS USED

Workshop Set (modified)

DATE

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Michael Wilkinson has been teaching math and science for nearly thirty years. He teaches 3rd through 5th math and science at Fieldston Lower School in the Bronx for the past 14 years. He taught 4th-6th grade math and science at the Bank Street School For Children in New York City prior to that. Michael is a curriculum innovator and constantly seeks to improve practice, creating engaging, developmentally appropriate learning environments for his students. Michael creates a learning environment where his students are

actively engaged in scientific inquiry - designing their own experiments and engineering lab apparatus to collect and analyze authentic data.

Michael is active in the integration of technology in his work with students, making use of various statistical and data collection software and sensing probes. His students design and build much of their own lab apparatus, frequently including littleBits modules in their designs. His students also engage in online discussion forums and class blogging. Michael is active in the social media community engaging in discussions about STEAM education best practices and is active in the NASA Social community. Michael blogs on space exploration and math education and is an accomplished photographer and amateur astronomer. He is a NASA Master Teacher and curriculum developer.

WHO WERE THE KEY PEOPLE IN YOUR ORGANIZATION THAT MADE THIS PROJECT POSSIBLE?

Rosemarie Buzzeo, Math Science Coordinator
Harry Sunshine and Alexa Shikar - 3rd grade Teachers
Jessica Fiewes and Jamie Leeds - Assistant Teachers
Lydia Fouto - shop teacher
Michael Wilkinson (author)

HOW DID YOU LEARN ABOUT LITTLEBITS AND WHAT MADE YOU DECIDE TO IMPLEMENT THEM INTO YOUR PROGRAM/CLASS?

I was introduced through a teacher meet up (Educator Discovery Workshop). After playing with the materials, I immediately recognized their potential as an “organic” classroom supply that is infinitely reconfigurable to meet whatever engineering needs of the students. I was also very much drawn to the gender neutral presentation.

EXPLAIN HOW YOU INCORPORATED LITTLEBITS INTO YOUR PROGRAM/CLASS? DO YOU HAVE AN OUTLINE OF YOUR PROCESS?

The littleBits set was used to run our 3rd grade ‘Creature Project’ unit for two classes, totaling 44 students. The project was split into the following class periods:

1. One session for student driven open exploration: usually I split the class into groups of 3-4 children with 2 power modules and an equal number of inputs and outputs, with a few wires. About 8-10 modules per group. I challenge them to try different combinations and understand the order of operations to grasp functionality.
2. Two sessions of guided challenges. For example, I’ll ask them to ‘make something that lights up’, ‘can be controlled with motion’. The task cards on the website are similar to how we run this activity.
3. One session to introduce the project. The students were asked to build a creature/structure that used a variety of materials. They were given \$75 of play money to purchase materials and they had to use knowledge of currency and mathematics in order to keep within their budget. These topics were addressed before this unit began. The students worked in pairs. The teachers explained what materials they could purchase, including wheels, craft materials, and littleBits. Recycled and found materials could be used free of charge. The students did some initial brainstorming on they wanted to build and considered materials/pricing they would need to create the creatures.
4. One session for shopping for materials. The students bought the materials with play money, checked out with the ‘cashier’ teacher and keep track of their budget. The littleBits modules were ‘leased’ and were set at a higher amount than the basic materials. Students had to factor in different modules + power to purchase using their knowledge of circuitry and engineering.
5. Four sessions (about a week) for construction and iteration of the creature.
6. One session using educreations (iPad app). Students narrated their projects and explained the design process using the voice capture function on the iPad.

The littleBits library was used to run our 3rd grade ‘Creature Project’

WHAT WORKED WELL?

We factored in plenty of time for the students to experiment, revise and adapt it. Some children went through three different designs before they ended up with their final project that worked (ex. 4wheel soda car; captured this on the app- can we see copy?).

Everyone was successful in the end and the groups were happy with their outcomes. The best part was that these were all kid driven projects and outcomes; all ideas and engineering decisions came out of their imaginations, which is very important.

Through this project, students gained insight on how circuits work, which led to connections in science on how to connect the littleBits to the nervous system.

This was a STEAM project - engineering and art were a big part of it.

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WHAT WAS A CHALLENGE?

Orchestrating a large group of kids and projects was the biggest challenge. Would be even more challenging for a school that doesn't collaborate well. Internally, finding time for the teachers who were involved to meet and collaborate was difficult.

A We used trays to keep the modules organized during class.



WHAT HAS BEEN THE RESPONSE OF YOUR STUDENTS/COMMUNITY?

The children loved the projects; they were very proud of their creations. They embraced the process of it and were able to discuss sticking points and how they overcame it. Everyone felt successful even if they had real challenges. They really owned it.

Parents and other teachers were also appreciative of the students' work. The projects were on display for a few weeks for the whole school to see and the project was referenced throughout the fall, especially at parent conferences and staff development meetings. We use it as an example for how we envision Fieldston moving towards as a school.

The littleBits modules were well received. The students loved working with them; many went home and had their parents buy them to use at home! Older siblings often commented on how their 3rd grade siblings were raving about them.

I'm really looking forward to seeing what this group does next year. Now that they have familiarity with the modules, the students will do great things and be able to apply them in a lot of different ways.

A 4-wheel drive soda bottle: The students (2 third graders) wanted to make something that moved. They knew they wanted to use the motors. Using 4 motors was an expensive item for their budget, so they needed use more "found" materials. They tried mounting the motors on a variety of chassis made from small boxes, but always had a problem with rigidity. The soda bottle turned out to be well suited for mounting their motors.



HOW WOULD YOU SUMMARIZE WHAT YOU'VE LEARNED IN IMPLEMENTING YOUR LITTLEBITS CLASS?

Time is really important to have the process unfold. Adults have to allow children to experiment, make mistakes and figure out how to work through them. At the end of the day, this is a learning experience: the real learning was having the time to reflect on their design, how to fix it and how to improve.



DID YOU UPLOAD PROJECTS OR LESSONS TO OUR WEBSITE?

We chose to use the educreations over the littleBits website due to comfort level of the 3rd graders to the app. They also didn't need to know how to type to do it; they can annotate and point at images on the screens and record their narration. This software supported their reflection better; project site doesn't have that/not kid friendly.

WHAT STANDARDS (IF ANY) DID YOU INCORPORATE INTO YOUR LESSONS/PROGRAMS?

Private school- none incorporated directly.

Addresses engineering, problem solving, finding solutions to problem, cause/effect, energy, presenting/communication/articulation/documentation of work (we'd need to look into this more)

WHAT ARE YOUR FUTURE PLANS FOR LITTLEBITS USE?

The tech department is starting Tinker Tuesdays (similar to STEAM Salons) to represent a maker space. They are also developing programming curriculum to incorporate logic and arduino.

I always look to littleBits as an organic material in the classroom, so it can be incorporated in any lessons. Ex. UV LEDs to look at pollen in flowers and exploring the light spectrum. There's no 'littleBits' project; it's a material that is always available for us. It's very much a kid directed classroom.