

EDUCATION

littleBits™

LITTLEBITS EDUCATION COMMUNITY CASE STUDY

## REGIONAL PUBLIC SCHOOL DISTRICT

BY  
Rebecca McLelland-Crawley

TITLE  
Middle School Gifted and Talented Facilitator  
Community Middle School

ORGANIZATION  
West Windsor-Plainsboro Regional School District  
New Jersey

AGE LEVELS  
4th Grade through High School

LITTLEBITS PRODUCTS USED  
Student Sets

DATE  
January 2015

## TELL US ABOUT YOUR TEACHING EXPERIENCE.

Rebecca McLelland-Crawley has been a science educator for 17 years. She is a National Board Certified Teacher and the New Jersey Presidential Award for Excellence in Mathematics and Science Teaching 2011 science recipient. Rebecca is currently a Middle School Gifted and Talented Facilitator for the West Windsor-Plainsboro Regional School District. Previously, Rebecca taught Biology, Marine Science, and Advanced Placement Environmental Science, has served as an instructional coach and district administrator.

Field trips, authentic investigations, and technology play key roles in her instructional strategies. Rebecca's students work with students in younger grades as Maker Ambassadors and connect with them through Skype, blogs, podcasts, and face-to-face mentoring in order to support the STEAM pipeline in her district. The work of her students has been recognized twice by the New Jersey Department of Education at Kid Tech Day and at Digital Learning Day in 2014.

Rebecca is past president of the Biology Teachers Association of New Jersey and is on the organizing committee for EdcampSTEAM in New Jersey. She has presented at numerous conferences on topics such as professional learning communities, maker education, the flipped classroom, bioscience career awareness, and the Next Generation Science Standards. Rebecca blogs for the National Board for Professional Teaching Standards, the Alliance for Excellent Education, and ASCD on education.



## WHAT GRADE LEVELS DO YOU TEACH WITH LITTLEBITS?

We recognize as a district that there is an ongoing need to foster a collaborative culture of creativity, innovation, and experimentation at a young age to encourage students to become interested and aware of engineering as a potential career field. We realize that these experiences need to be in the hands of all of our students in order to make the greatest impact. All of our 4th grade teachers have 4 Student Sets each that they can take out from the Media Center at any time to incorporate in their routine as they see fit. While many of the tinkering activities of littleBits align to our electricity unit, they were not purchased exclusively for this purpose. We want to support our learners with creative tools to expand the way they think about the world.

Our 4th grade teachers are now beginning to use the littleBits within the existing curriculum to investigate the properties of electricity. Students may build model flashlights, test different materials for conductivity, and create circuits that illustrate concepts of energy transfer, energy conservation, and the conversion or "loss" of energy to heat. The addition of littleBits will supplement existing curriculum where students investigate circuits, but will also support engineering practices in the classrooms allowing all students to design their own projects. Our hope was that the curriculum supplement will enrich the science curriculum with hands-on maker projects that can be used throughout the school year and activities linked to the engineering practices of the Next Generation Science Standards.

I am also using the littleBits with my middle school students who serve as Maker Ambassadors to both our school and the upper elementary school next door. We also have students in a high school Environmental Science class use the kits to develop terrestrial rovers and partner with an elementary classroom to mentor younger students on ecology and engineering.



## EXPLAIN HOW YOU INCORPORATED LITTLEBITS INTO YOUR PROGRAM/CLASS?

We began incorporating littleBits last year with a small pilot with a HS Environmental Science class working with littleBits to generate their own rovers to explore an outdoor habitat and explain their understanding of ecosystems to their elementary school proteges. From this two classroom pilot, we expanded to all of our 4th grade classrooms having access to multiple kits and professional development on the use of littleBits for electricity units and genius hour projects. In order to better support the 4th grade roll-out and to encourage more student to student mentoring, students with an interest in making are invited to participate in my Maker Ambassador program. They meet both virtually in Edmodo and in the gifted and talented classroom to develop strategies to teach others about what they are inventing. They regularly look up existing plans on the littleBits site and tweak them for our classroom. They are also learning about Arduino and coding in our Edmodo Maker Ambassador hangout. This allows them to become experts so they can improve the STEAM pipeline.

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

This program would not have been possible without the vision and support of our district team under the charge of our Superintendent, David Aderhold. On February 14, 2014 David Aderhold and I presented a workshop on the maker movement during the district professional development day. The goal was to increase awareness of the benefits of making and tinkering in the classroom through the use of littleBits. Teachers were ecstatic and feedback was overwhelmingly positive. Many teachers wanted to have kits for their classrooms to use with their students. As a district leader, David Aderhold has taken a very hands-on approach to endorsing programs that encourage all of our students to think outside of the box. His support has been crucial to the success of the program. His passion for the maker movement has spread to the Board of Education and our teachers through his deliberate use of tinkering supplies at meetings. Our Education Foundation enthusiastically funded our kits for the district. Without their generous financial support, an initiative this massive in scale would not have been possible.

We would not have known just how much all of our students learned from littleBits if it were not for the program Danielle Bugge and I tossed around as a potential pilot for Environmental Science students in the 2013-2014 school year. Danielle Bugge, a HS South Environmental Science and Physics teacher, helped design, implement, and revise rover construction with high school and elementary school students. Her experiences with Lisa Rizzello's class helped us further tweak how to better meet the needs of all students. Watching the enthusiastic partnership blossom between the elementary and high school students prompted a need for this to take place in more than two classrooms.

Upon further talks with the administrative team and science coordinators at the schools, we determined it would be an incredible resource for our teachers if they had littleBit kits for the electricity unit currently in place in the 4th grade curriculum. Russell Wray, the Technology Supervisor, and I began working on a grant request through our Education Foundation to secure funding for the 4 Student Set kits per teacher across the regional school district. Russell continues to support the program at the district level, while my work focuses on developing Maker Ambassadors at the middle school level. Russell also cleverly designed our own tackle box kits for teachers to check out from the Media Center and continues to provide in class assistance to teachers jumping in to the uncharted waters.

We received word in June that we were approved and we began developing a plan for organizing nearly \$15,000 worth of littleBits into our district classrooms.



## WHAT WORKED WELL?

We are fortunate to have a district filled with highly effective educators who seize new opportunities for their students. Bringing all of the teachers together to work out plans and ideas for their classrooms has helped move things forward in the early implementation.

In October 2014, all 4th grade teachers attended a ½ day workshop introducing them to the maker movement and project designs with their littleBit kits. The kits were unveiled and teachers worked with their colleagues on design challenges using paper towel rolls, construction paper, bananas, water bottles, marshmallows, pasta, and littleBits. It was a “Teacher Invention Convention” and the session received accolades from the attendees.

Our gifted programming at the middle school level encourages students to select a research path appropriate for their passions. I introduced a Maker Ambassador program to all 6-8 grade students, whether they are in the advanced track or not, and have several students actively working on projects and blogging about their experiences. One of the main goals is to develop makers who can assist the 4th grade students and teachers in their tinkering. They visit the school and use Google Hangout to meet virtually with classrooms to facilitate project development. Leveraging the students to mentor other students has also worked really well in building bridges between different schools.

## WHAT WAS A CHALLENGE?

Organizing messy learning is always a challenge. We do not want to structure the program too much because we want the students and teachers to have the liberty to design their own projects. In meetings, we developed a plan for all of the kits to be sorted into tackle boxes and organized for teachers for ease of use. Russell Wray took the lead of designing our own tackle boxes to house all of the teacher sets. We also worked out a strategy where the cases would be housed in the school media centers and checked out by the teachers when needed. This was done to assist the teachers by helping to avoid any of the pieces being lost in the classrooms. In addition, our gifted and talented programming utilizes the space in the media center and wanted to make use of the kits for ongoing tinkering student passion projects.



## WHAT HAS BEEN THE RESPONSE OF YOUR STUDENTS/COMMUNITY?

We learned that our students have great capacity to learn and create in areas of STEM. littleBits allowed our students to synthesize their knowledge while creating remarkable projects and learn every step of the way.



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

We learned that our students have great capacity to learn and create in areas of STEM. littleBits allowed our students to synthesize their knowledge while creating remarkable projects and learn every step of the way.



## WHAT STANDARDS DID YOU INCORPORATE INTO YOUR LESSONS/PROGRAMS?

NGSS HS ETS1 Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

NJCCCS 8.2.4.B.2 Design an alternative use for an existing product.

NJCCCS 9.1.4.A.5 Apply critical thinking and problem-solving skills in classroom and family settings.



## WHAT ARE YOUR FUTURE PLANS FOR LITTLEBITS USE?

We hope that by incorporating littleBits in our classrooms and allowing teachers the freedom to use them for a variety of student-directed experiences, we will not be confined to individual classroom makerspaces, but a district-wide maker mentality.

