

It's Loud and Clear Why These Kids Love Science

A+ Mobile STEM Lab Turns Students Into Scientists



Fifth-graders at New York City's PS 108 use special probes to sample and measure the world around them, including levels of sound, temperature, speed and light. Learning to gather, graph and analyze real scientific data engages students in a way that pure text book learning cannot.

The cacophony of each of the three daily lunch periods at New York's Philip J. Abinanti PS 108 echoes down the hallways each time the cafeteria doors swing open. The grade school, including its noisy cafeteria, serves nearly 600 students in Kindergarten through 5th grade. It is located within a working class, ethnically diverse neighborhood in the Bronx.

The daily racket of boisterous students, socializing during their lunch period, is enough to set most teachers' head spinning. However, for one science teacher, Ms. Kathie Tirelli, the noise served as inspiration for a lesson on scientific investigation and controlled studies conducted by her class of 5th graders. Ms. Tirelli's class is in the midst of a year filled with hands-on scientific discovery made possible through use of an A+ Mobile STEM Lab, manufactured by A+ Mobile Solutions of Bay Shore, NY.

The A+ Mobile STEM Lab combines state-of-the-art, grade-appropriate STEM related tools, activities and teaching materials, along with data management and presentation technologies, to create a powerful, turn-key laboratory environment. For Ms. Tirelli's students, it brings classroom lessons to life, while simultaneously allowing her to be more efficient and effective in presentation of important STEM concepts.

One of her classes' recent lessons sought to determine whether some lunch periods are louder than others. While a seemingly simple question, this scientific study provided students with a learning experience that exposed them

to a wide range of important principles, including designing their experiment properly, data collection, analyzing of results, drawing conclusions and presentation of findings. The Mobile STEM Lab facilitated every step of the process.

Gathering the Data:

To take sound samples, students used portable data-logger devices equipped with sound sensors. (The dataloggers can also measure light, temperature, humidity and pressure.) Sound was measured in decibels, with readings appearing on the LCD Display located on each datalogger. Using proper experimental design, samples were collected over several days during each lunch period, so as to provide a range of data points reflecting normal fluctuations. "The students love collecting data," explains Mrs. Tirelli. "It makes them feel independent and they're excited about conducting a real experiment on their own. It makes the scientific process tangible and real for them."

Time for Analysis:

Back in the classroom, the dataloggers wirelessly transmitted the sample data via Bluetooth to the laptop computers. The computers are loaded with software, especially designed for use with the dataloggers, that allows the students to retrieve, view, organize, analyze and graph the data. In this case, each decibel reading from the cafeteria included the precise time and date it was taken. (The software has the ability to include over 1000 samples within a single data set.) Using this software, the students created

A+Mobile Solutions provides a portable and affordable means of bringing technology to the classroom. Currently, there are over 400 mobile labs and laptop carts in use within the New York City school system.

The A+Mobile STEM Lab provides hands-on tools for integrating science, technology, engineering and math experimentation within classroom lessons, engaging students in a way that can't be done with pure textbook learning. The Teacher's Mobile Command Center and Intelligent Laptop Cart support the use of computer and presentation technologies, allowing students and teachers to make more efficient use of classroom time.

charts and graphs that displayed their findings, plotting the decibels that had been logged over time.

Throughout this process, Ms. Terelli was able to supervise the students' progress using Laptop Management Software. It allowed her to see from the A+ Mobile STEM Lab's whiteboard what each student was working on, in real time, making it easy for her to intervene and proactively offer assistance as needed. And, when she needed the entire class' undivided attention, she could temporarily "silence" the laptops, disabling student access while she spoke. The laptop computers used by Ms. Tirelli's class are included as part of the elementary school version of the A+ Mobile STEM Lab, and come preloaded with Student Microsoft Office. (For junior high and high school versions, A+ Mobile Solutions offers a separate A+ Intelligent Laptop Cart that creates a fully integrated Teachers Command Center, enabling teachers to monitor, guide and control

student activity while delivering STEM/STEAM applications.)

Presenting Results:

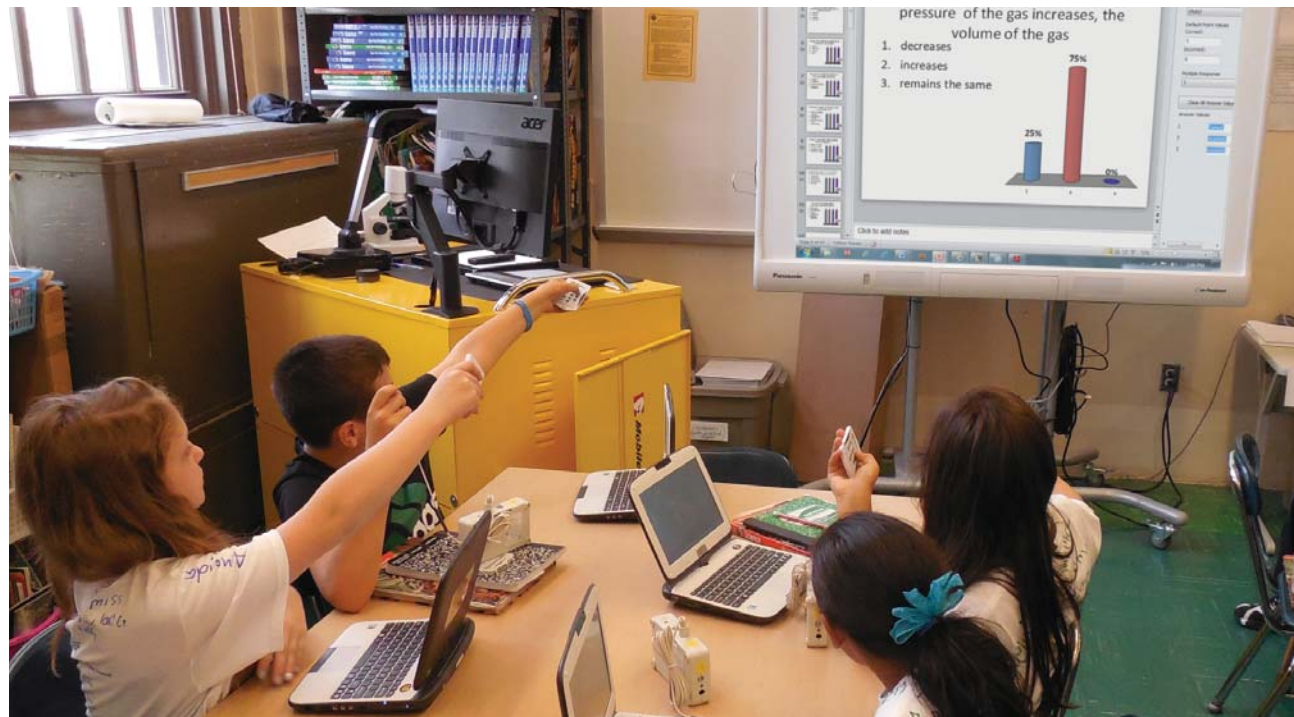
Then, it was time to analyze and present their findings. The class created PowerPoint presentations to summarize their results, including the charts and graphs they had created. The process of creating the PowerPoints, which summarized the entire scientific process from creating a hypothesis to reaching a conclusion based upon analysis of actual data, and then presenting them to the class, provided additional reinforcement of key principles taught in this lesson. Ms. Tirelli explains that "Using the A+ Mobile STEM Lab totally engages the students. It's particularly effective for kinesthetic learners, who will be far more likely to absorb and retain the meaning of the lessons having physically participated in the experimental process."

Assessing What's Been Learned:

Ms. Terelli also used the A+ Mobile STEM lab to conduct pre

and post assessments of what the students learned from the entire project. Using response clickers, she conducted quizzes of key concepts and scientific vocabulary, with students immediately logging their answers to multiple choice test questions with a simple "click."

She explains that the clickers make test-taking fun for the students, and are particularly effective for assessing the knowledge of children who struggle with writing. An added benefit is that grading of tests becomes automated and immediate, eliminating the need to bring stacks of tests home in the evenings. "The kids love the clickers, and so do I," she says.



Students use clickers to answer questions about what they've learned, and a graph of student responses appears immediately on the whiteboard. Using the clickers makes test-taking fun while eliminating a great deal of administrative work for the teacher.

Creating Tomorrow's Scientists:

In addition to the "Sound" experiment, Ms. Tirelli's class has also used the dataloggers this year to conduct experiments related to light, temperature and heart rate. One study tested whether pricey RayBan sunglasses block more light than inexpensive sunglasses. Another tested whether taking pulse rates manually provides the same result as using a heart rate monitor.

"My students feel like real scientists. Hopefully, classes like this make them feel confident about their abilities, and will encourage them to continue with their science education throughout high school and possibly college," says Ms. Tirelli. "And, by the way," she adds with a smile, "In case you were wondering, the second lunch period is the loudest."

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