

# The Knightspot

A Spotlight on Education in New Milford, New Jersey.

## Hands-On Learning for Elementary Students Makes Science Come Alive

What do you remember about the science classes you took in high school? Odds are, you don't remember the days you read from the textbook and answered questions. It's more likely you recall the day you dissected the frog or smelled sulfur for the first time. Those are the classes that not only were likely to leave an impression, but they were probably the days you learned the most about science. The New Milford School District has adopted an elementary program this year, FOSS Science, a research based science curriculum that provides hands-on science on a regular basis in order to provide engaging, meaningful learning experiences for students.

"The philosophy behind FOSS," states Lauren Odoksta, Director of Elementary Education, "is to bridge the gap between research and practice by engaging students in enduring experiences that lead to deeper understanding of the natural and designed world." The core trait of this approach is that instruction no longer centers around a textbook; instead students learn through doing. Each science lesson is called an "Investigation" during which students are trying out different strategies, testing



Students use wind vanes to determine wind direction.

theories and exploring answers to a question. "There is always a concept they are attempting through their own exploration," continues Odoksta. "For example, if studying air, students might build parachutes and then launch them from different locations to determine different properties of air."

FOSS was selected for K-5 after a committee of several teachers and administrators researched and reviewed various programs. "There was a need to revise the science curriculum to provide more opportunity for students' active engagement in the learning process rather than rely solely on textbooks," Odoksta says. "We wanted more of an emphasis on

process and hands-on engagement."

Each elementary grade level participates in three modules over the course of the school year which coincide with the trimesters (Physical Science, Earth Science and Life Science). These modules focus on the units of study required by New Jersey Student Learning Standards in Science. Furthermore, FOSS provides a suggested scope and sequence which New Milford reorganized to support outdoor learning in the warmer months. At the end of this first year, Odoksta plans to revisit the scope and sequence with teachers to determine if changes are needed. She points out, "It remains a living

document and the order of modules can be revised easily.”

Within each module are five to eight investigations. In first grade, the three modules they explore over the course of a school year are Air and Water, Sound and Light and Plants and Animals, with some Investigations taking place over the course of several days. During Sound and Light, students explore questions like: “What kinds of sounds are easy to identify?” “How can we make low pitched or high pitched sounds?” “How does sound travel from a source to a receiver?” Students learn how to observe and manipulate sound and light by using simple tools and musical instruments. They change sound, volume and pitch, develop simple models for how sound travels from a source to a receiver, and more.

An Investigation begins with a mini-lesson during which the teacher sets the focus question for the Investigation. Prior knowledge is referred to while new ideas and concepts are introduced. Second, the students investigate and explore answers to the focus question using hands-on materials. The next step is for these elementary scientists, as they are referred to, to go to their science notebooks and record their observations. They draw, label and write what they observed and learned. Finally, students write a written response where they reflect on their experiences and express their responses to the focus question. Throughout the entire Investigation, teacher and students are using science vocabulary related to the module. At the end of a unit,

scientists complete a written assessment that might again involve drawing, labeling and certainly writing. This part will require them to use their learning from the Investigations and apply it.

**“This program allows all students the opportunity to think out of the box’.”**

-Lisa Horgan, Berkley  
First Grade Teacher

When investigating the focus question, “How can we use sound to communicate over long distances?”, Lisa Horgan’s first grade class partnered up and used two cups attached by a string. Each student took turns talking into their cup and then listening as their partner spoke into the other. So instead of just reading about how sound travels, these six and seven year olds experienced it by feeling the vibration of the string and hearing the sound for themselves. One pair even took it a step further and realized that when they held the string tightly, it disrupted the vibration and cut off the sound!

Students’ reflections in their science notebooks capture their understanding. One example is, “We can use sound to communicate by. The vibration from your mouth goes into the cup. And it goes through the string. and then it goes into the other cup. And then it goes into your ear. And then you hear the vibration.”



Fifth graders make and separate mixtures.

“The hands-on approach is so meaningful for the students,” comments Horgan. “Students get very excited in the morning when they see Science on our daily schedule. The program allows all students the opportunity to ‘think out of the box’ and really demonstrate what creative, scientific thinkers they are. They have the chance to show how much they truly understand about their world and how things work. It truly is a fun way to learn!”

In addition to the active Investigations, FOSS provides each grade level with nonfiction texts used as resources for each module. Written much like a nonfiction text students study in Readers’ Workshop, these are used to provide background information and inform Investigations. These resource texts are housed in the Science Room or on a cart shared by grade level or some are kept in a Science bin in the classroom.

FOSS also offers FOSSweb, an online resource for teachers and students. This platform provides professional resources, student and teacher materials, lessons and videos. There is also a home component which students can access outside the school day. In addition to this online support for teachers, a FOSS representative is visiting both schools for professional development throughout the school year.

Both elementary schools have designated science discovery labs. Created some years ago, they are now used on a regular basis for indoor investigations. Since lessons involve a great deal of

teacher preparation in order to have the tools needed, teachers work collaboratively on grade level to prep the materials. Then, at different times, classes cycle through the science discovery labs to conduct their investigations using the prepared materials. Designed to house such supplies, the labs have cabinets and closets where items can be stored and then used when conducive to a

part of their classroom communities.

The adoption of a hands-on, student centered science program is consistent with the district’s emphasis on a student-driven, experiential learning environment. Instead of telling students what to do and how to do it, they truly become mini-scientists; students ponder, try out, and draw conclusions on their own.



Grade 2 geologists observe sort and identify earth materials.

particular class’s schedule. A shared Google calendar provides teachers with a way to sign up to use the room.

Another feature of this new approach is classes’ observation of animals such as fish and snails. These living materials can stay in the labs, but they can also live in the classrooms. There, students can observe changes over time; in addition, these animals become

Teachers have worked diligently this year, to implement this meaningful program. The effect is already noticeable in students’ positive responses and deeper understanding. When one third grader was asked how he likes science this year he enthusiastically said, “I love it, because I get to do it!”