

The Little Scientists

Some preschools are testing a new program that makes science the foundation for virtually everything youngsters are learning in school.

By Linda Jacobson

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On the snack menu in the afternoon prekindergarten class at Parkland Elementary School is a new item on the market: clear, strawberry-flavored Jell-O with tiny moon and star shapes. The child-friendly product would likely pique the interest of any finicky 4-year-old, but that's not why pre-K teacher Sheryl O'Shea chose it. The jiggly treat is a perfect complement to the students' study of color and light.

"It's transparent," says one girl as she looks through the small plastic cup.

"No, it's translucent," another corrects.

"Why do you say it's translucent?" Ms. O'Shea asks.

"Because you can only see through it a little," the child responds.

At Parkland, located in the suburban, 14,000- student Greece Central school district just west of this manufacturing city of 230,000 people, even snack time can be used to explore and discuss scientific concepts.

The 360-student school, which has two state-financed pre-K classes, is one of several in the area that—instead of trying to squeeze an occasional science experiment into the curriculum—are now using science as the basis for everything the children do during their 2 1/2-hour school day.

On this day recently, even the area reserved for housekeeping and dramatic-play in O'Shea's classroom—a fixture in most early-childhood programs—is linked to the sun, moon, and stars lessons, which are part of the unit on color and light. The youngsters pretend they are camping out under the stars and writing letters home to their friends and family. They hear stories about nighttime and can name nocturnal animals.

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Some preschools are testing a new program that makes science the foundation for virtually everything youngsters are learning in school.

Developed by Lucia French, an associate professor at the University of Rochester's graduate school of education and human development, this approach to teaching preschool—which she has named ScienceStart!—is a shift away from the way most early-childhood educators teach science.

"There are a lot of programs that treat science as magic, but that's not what we're doing," says French, who has received National Science Foundation and U.S. Department of Education grants to write and field-test the program. "There are books like '101 Things to Do With Baking Soda,' but no one is explaining what's happening."

A science-based curriculum, she says, responds to young children's natural instincts to ask questions about the world. And at a time when state and federal officials are most concerned about improving children's literacy skills, French's research is showing that using science—blended with good literature—is one way to achieve that goal.

"It's a way of putting in loads of content without 'drill and kill,' " French says.

As the Jell-O conversation at Parkland Elementary shows, children are using and understanding vocabulary words that most preschoolers and even many primary-grade pupils wouldn't comprehend.

Assessments administered as part of French's research bolster that observation.

One expert on early-childhood warns that if the teachers involved aren't interested in science, the children probably won't be either.

On widely used tests of children's ability to speak and understand what they hear, French found that children using the science curriculum at Parkland made greater gains over time than those in other pre-K classrooms in the district. "It is important to note that this vocabulary was picked up incidentally, without direct teaching, in the course of participation in a language-rich classroom," French wrote in a report to officials of the Greece district.

And at John Williams School No. 5 in the Rochester school district, children who initially had a 3-year-old's ability to understand vocabulary made a 15-month gain after being involved in ScienceStart! for six months, according to language tests.

Still, one early-childhood expert says there are some factors a preschool should consider before deciding whether to focus so much attention on science. For instance, Marilou Hyson, an associate executive director of the Washington-based National Association for the Education of Young Children, says if the teachers involved aren't genuinely interested in science, then the children probably won't be either.

In the Parkland classroom, O'Shea sits in a small chair with a basket of blocks on her lap. Some are covered with a furry material, and some with a rough surface, such as sandpaper. She hands the blocks out to the children surrounding her and tells them to find a classmate with a block covered in the same material.

"The outside is soft and the inside is hard," one boy says about his block, as the teacher makes a list of the words the children use to describe the various textures.

This study of the properties of matter—one of the units in French's curriculum—continues at the round tables, where children finger-paint for a smooth feeling; and glue rice, sand, glitter, and dry alphabet-shaped pasta onto paper to make rough-textured pictures.

To follow this curriculum the way it was intended, French recommends that teachers give up units that focus on themes and holidays, both of which are often used in somewhat disjointed and superficial ways to organize the preschool curriculum.

Still, Pat Swedrick, a pre-K teacher at the 1,200-student Audubon School No. 33—one of the schools here in the city that are using ScienceStart!— is still able to blend a discussion of the scientific

concepts of soft and hard together with activities related to Black History Month and other subjects, such as music.

Using a "rain stick"—a long wooden tube filled with rice or beans that is often associated with African rituals—Swedrick talks to her students about soft and hard sounds. The children demonstrate that they know the difference by beating drums and sticks together, first hard and then so lightly they can barely be heard.

"It just takes some planning," Swedrick says about covering certain events or topics. "If you can find the right literature, it brings it all together."

Sheila Murphy, a special education teacher in a prekindergarten class at School 33, gathers pieces of paper, feathers, cotton balls, a wooden toy iron, and other items on the floor in front of an electric fan. Before she turns on the fan, she asks the few children sitting near her what they think is going to happen.

Asking for predictions is one of the steps children take in French's program as they learn about scientific inquiry. They also plan their actions, observe what is taking place, and report and reflect on what happened.

When one of the pupils switches the fan on, another little boy shrieks with delight when he sees how far the cotton ball blows across the room.

One child in her class, Murphy says, overcame his fear of the hand dryers in the school bathroom by working with the fan.

'I like that we can teach kids not to be afraid of spiders, and to think rocks are beautiful.'

Sheila Murphy,
Special Education Teacher

"I like that we can teach kids not to be afraid of spiders, and to think rocks are beautiful," she says.

Other teachers point out other important lessons the children have learned.

Marie Munier, a pre-K teacher at School 33, says the program has taught the students to be respectful of tools such as magnifying glasses and flashlights—items that she used to put away after a lesson, but now leaves out so the youngsters can use them more regularly.

And Swedrick says her pupils look forward to walking through the garden just outside their classroom with clipboards and crayons in hand, ready to collect data. They are instructed to examine how plants and flowers in the garden have grown, determine what is blooming, and take note of what bugs and birds are there. The children are then encouraged to draw pictures of their observations. School No. 33, which uses ScienceStart! in five of seven pre-K classrooms, is where French's curriculum is being revised and polished as teachers share ideas and mistakes.

On this February day, French learns as she talks to teachers that they are having trouble presenting the concept of a liquid without having a solid for comparison. Several of the children ask if sand is a liquid because it can be poured.

French's attempts to do a controlled study at the school have been compromised, though, since the teachers who weren't initially using the curriculum, she chuckles, became "jealous" of the success the other teachers were having with it and started incorporating the units into their own teaching.

Parents play a part, too, in the ScienceStart! approach. They receive simple experiments, enclosed in plastic baggies, that they're encouraged to use with their children. These ZipKits, as they are called, are designed to engage parents and children in open-ended activities.

"Even parents weren't aware of how shadows were formed," Munier says, pointing out that each ZipKit for the shadow lesson included a small flashlight, and parents were instructed to put different items in front of the flashlight's beam of light to show their children how a shadow is formed.

The kits—there are now about 20 of them—also foster a connection between home and school because teachers call the parents to see how the activities worked.

In spite of growing pressure to focus on early reading skills during the preschool years, the teachers here at School No. 33 say their students' parents haven't questioned the emphasis on science and are happy with the knowledge the children are gaining.

Six family child-care providers in the city are also using a once-a-week version of the program. With simpler activities involving cooking or painting, French says this scaled-down curriculum is a good introduction "for those who are terrified of science." But already, she says, many of the providers are asking for more materials and ideas, most of which involve the use of household items. For instance, a large tub filled with water can be used to compare why some items float while others sink.

Surprisingly, French's background is not in science. Her earlier work focused on early language development and why children from low-income families perform poorly in school.

In the early 1990s, she received a \$200,000 grant from the Eastman Kodak Co., based here, to develop a "state of the art" preschool program. French believed that making science the vehicle for the program seemed an appropriate way to use the money. That project led to the first use of ScienceStart! at a church-based Head Start program in the city.

"Kids who were difficult to handle just became engaged," French says. "They weren't throwing sand at each other. They were deciding whether sand was a liquid or a solid."

French's \$500,000 NSF grant is one of several that the federal science agency has awarded since the late 1990s in an effort to improve young children's exposure to science and give them the "concrete experiences" that many don't have in this television and computer-game era, says Rowena Douglas, the program director for K-8 science at the NSF.

"School science should be fun, and preschool science should be even more fun," she says. Douglas adds that while interest in science is growing in the preschool community, it's "still a market that is pretty much untouched."

Another \$2 million grant went to the Education Development Center in Newton, Mass., to design a preschool science curriculum.

Now in the third year of development and piloting, "Science Explorations: Engaging Young Children in Inquiry" focuses on exposing children to the scientific potential of materials that are common in early-childhood classrooms. "There are always blocks in the classroom, there's always the outdoors, and there's always water," says Karen Worth, a senior scientist at the EDC, a nonprofit research and program-development organization. "Science can really become the core of what happens in early-childhood classrooms."

The problem, she says, is that too many preschool teachers don't move beyond isolated activities involving science. And simply having a "science table" doesn't "encourage and challenge the children to go deeper," Worth says. "They are cognitively more capable than that."

Instead of just building block towers, children in the classrooms that are using the program should be

introduced to the concepts of balance and equilibrium, Worth recommends. And she says they should take pictures and draw what they've created so they can see how their work has changed over time.

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Adam Rosen,
The Vermont Center
for the Book

The EDC's original objective was to write standards for preschoolers in science—a process that is already occurring for early education in other subjects and that some states are undertaking as well.

But the organization later decided that it would be more appropriate for a national organization to take on that task. Instead, the EDC will publish a book that demonstrates how preschool teachers can adapt the K-12 national science standards written by the National Academy of Sciences.

A science-based approach to early-childhood education, however, is not limited to center- and school-based programs.

The Vermont Center for the Book, a nonprofit group that promotes learning through the use of books, is training family child-care providers in both Vermont and Philadelphia how to blend scientific concepts and experiences into discussions about books.

"We're improving the teachers' vocabulary, and we're improving the language that they use with the children," says Adam Rosen, an early-childhood specialist at the center in Chester, Vt., which also received NSF funding for the three-year training initiative. "Teachers find that it's very empowering for them."

While the center is also training preschool teachers, Rosen says the home-based providers are often able to change their practices more quickly.

In a separate family-literacy project run by the Vermont center, called "Mother Goose Asks Why?," parents of young children read books that present scientific ideas, and then work with related materials, similar to French's ZipKits.

While French's research has focused on the literacy benefits of a science-based program, the early exposure to scientific concepts can also help children build the knowledge they'll need in that subject in elementary school, says Jo Anna Vasquez, a science education consultant and a past president of the Arlington, Va.-based National Science Teachers Association.

"They are laying the foundation for those process skills and observation skills," Ms. Vasquez says. "It's about learning to ask the right questions."

Preschool science lessons build a 'foundation for those process skills and observation skills.'

Jo Anna Vasquez,
Science Education
Consultant

American children generally perform well in science up through 4th grade. Results of the most recent National Assessment of Educational Progress science test, released late last year, showed that 66 percent of a sample of 4th graders scored above the "basic" level, and that 29 percent performed above the "proficient" level.

Fourth graders in the United States were also ranked among the best in the world, according to the 1995 Third International Mathematics and Science Study. But that study showed that as American children get older, their science skills drop significantly compared with those of their international peers.

That's why some experts believe getting children to think and talk about science in preschool could build a solid base that will help them perform better in the subject in later years.

And experts say that effort starts with training teachers to infuse science regularly into the teaching of

preschoolers.

With the \$1.34 million grant French has received from the Education Department, she's trying to make the professional-development piece of the curriculum more manageable, but also keep it thorough enough so that teachers are well-prepared. "You can't just hand someone the curriculum," she says.

She's also trying to build a library of videos that demonstrate how teachers are covering the topics in the classroom.

At that point, she believes the ScienceStart! curriculum will be ready for a national field test. But already, teachers are contributing all sorts of ideas.

"I was looking for ways to explain reflection," says Heather Palmatier, a student-teacher in Marie Munier's classroom. Palmatier finally came up with an experiment that she found on the Internet involving a flashlight, water, and an aluminum can.

"I think people don't realize," she says, "that children can learn this stuff."

In the early grades, the Little Scientists® curriculum serves as a strong foundation for the integration of science and technology. I highly recommend this program. " Dr. Maria DiazPrincipal, Bronx, New York. I know the Little Scientists® program will enhance and raise our science test scores. " Gloria BennettVeteran Teacher, Augusta, GA. We really loved our science lessons and the many experiments that we did. This has been a great learning experience for everyone involved. " Simone MinichinoTeacher, New Haven, CT. Creative Little Scientists aims to bring together creativity and science and mathematics in preschool and first years of primary education (up to the age of eight). It will provide a clear picture of existing and possible practices, as well as their implications and the related opportunities and challenges. Based on this, the project will propose guidelines, curricula and exemplary materials for relevant teacher training in the various European contexts. ISLAMIC FUN SCIENCE "When you explore Little Scientists, you explore your Iman." said Ustazah Isfadhah Dasuki. With the combined effort of our consultant, Ustazah Isfadhah and the Team, we have integrated Islamic values into Little Scientists Programme. www.LittleScientistS.com #Islamic #Children #Science #Islam #Education #Kindergarten #Preschool.