

Deborah Roberts-Harris

LITTLE
SCIENTISTS

SCHOOL CHILDREN DESERVE
MORE CREDIT WHEN IT COMES TO GRASPING
CONCEPTS IN SCIENCE.

Deborah Roberts-Harris is happiest in the classroom, where she has taught science and mathematics in grades 1 through 8. She has taken sojourns, however, for good cause: to advocate for better science education, conduct research on how to transform kids into highly motivated scientists, and head HHMI's Elementary Student Inquiry Program for the Montgomery County (Maryland) Public Schools.

Are we teaching children at the right level when it comes to science?

Children's thinking and capabilities are more sophisticated than we once believed. Kids know and can do amazing things even before they start kindergarten. New research is showing that even the youngest children are little scientists and have critical faculties—they have remarkable abilities to assimilate information and abstract ideas and make logical sense out of them.

How should educators make the most of children's capabilities?

We need to build on students' ideas of the natural world and provide experiences so that they can continue to think and act like scientists. We need to expose kids to the range of methodologies that scientists use, such as observation and historical reconstruction. While we want kids to have hands-on opportunities, science lessons must also be rich enough so that children can have discussions in which they debate and challenge each other.

You are part of a National Research Council committee that recently called for sweeping changes in the way science is taught—reworking science standards, curricula, assessment, and instruction as well as upgrading professional development for teachers. These are tall orders. How would you begin addressing them?

The place to start is by coming up with a coherent body of core concepts—central ideas that can be introduced at varying levels of complexity over the K–8 years—that is easily integrated into the sciences. Then we must create materials, methods of assessing progress, and systems of support for teachers that focus on these ideas.

What is an example of a core concept?

We clearly need to identify concepts that are critical in science, such as variations in species and how plants and animals adapt to their environments, and figure out how to build on these concepts over time in ways that are developmentally appropriate and meaningful to children.

The concept of ecosystems is a good example. Every kid has had some experience with a variety of ecosystems. We start out with simple ones and then take the students to higher levels of complexity as they get older. Certain fundamentals exist in any ecosystem, be they biological, chemical, physical, technological, or even historical. We could look, say, at a particular species of animal that has become extinct and talk about the factors that led to this outcome. Or we could discuss the chemistry of particular ecological issues. On the East Coast, for example, putting salt on the road in wintertime affects the ecosystem—and not just in the immediate community: it can have a wide-ranging ripple effect.

Everything in the world affects everything else?

Exactly. We can help kids develop an integrated understanding of the relationships between things: planting a seed and watching what happens when you put salt on it, or don't give it any light, or put it in a smoke-filled container. They can latch on to those ideas if we're building on these core concepts.

How does this approach differ from the way science is taught today?

We currently have a fragmented, piecemeal approach—we teach earth science or physical science for so many weeks and we don't make the connections or build upon students' understanding. And because of this fragmentation, kids don't develop a meaningful knowledge of science.

What is your hope for this country's next generation?

I'd like to see our scientific literacy increase because our children can build connections that make sense and help them remember—as opposed to learning things in isolation, promptly forgetting them, and failing to see any connections whatsoever. I would also be thrilled to see children so excited about science that they didn't care if their friends thought they were weird for loving the subject.

INTERVIEW BY LINDA MARSA. *Deborah Roberts-Harris teaches fifth grade in Queen Creek, Arizona.*

For a copy of the NRC report, Taking Science to School: Learning and Teaching Science in Grades K–8, visit www.nap.edu/catalog/11625.html.