

Bringing more diversity to the sciences starts in the classroom

NEED SEEN FOR MORE TEACHERS OF COLOR, MORE INCLUSIVE APPROACHES TO LESSONS

By Katrina T. McKelvin

It wasn't until seventh grade that I had a teacher who looked like me.

Mr. Green taught science at New London Junior High School and he was pretty much a legend. Lots of students liked him and, although science was not my favorite subject, he made every class interesting.

After junior high, I did not have another Black instructor until I earned my master's degree in English. That was 2013. I was 39.

The lack of minority faces at the front of classrooms is not a new phenomenon. What's even more disconcerting is the scarcity of those instructors leading science classes.

Jeanette Davis, a marine microbiologist who works on science and policy at a federal agency, is the author of *Science is Everywhere: Science is for Everyone*. Initially geared toward elementary students, the book explains how the different pathways of science can be found in everyday life.

The concept for the book first came to Davis four years ago, when she attended a workshop on professional and personal development. Participants were asked to “dig deep” to discover how to motivate themselves to achieve their stated goals.

“It came out of a need for me to contribute to science in a way that was not limited to a science experiment,” said

Davis, who earned her doctorate in marine microbiology from the University of Maryland. “I also wanted to fill the void that exists with Black women and science. People don't look like me and I (wanted to answer the question) ‘why is that?’”

Growing up in Wilmington, Del., Davis wasn't exposed to a variety of sciences, but she always thought the subject was “cool.” She was the kid who asked questions in class. However, it wasn't until fifth grade—with Mr. Holder — that it all clicked.

A high achiever, Davis routinely earned perfect scores on her science assignments and completed extra credit tasks. Mr. Holder, said Davis, made science fun. He helped her recognize that all the things she found interesting—flowers, ants and dirt—were aspects of science.

“That is why the book emphasizes that science is all around us. We think of science as this abstract, complicated thing, but it's all about curiosity and asking questions,” Davis said. “As a young person, you are naturally curious. You naturally explore. All of these are attributes and skills you need as a scientist, and all kids have them.

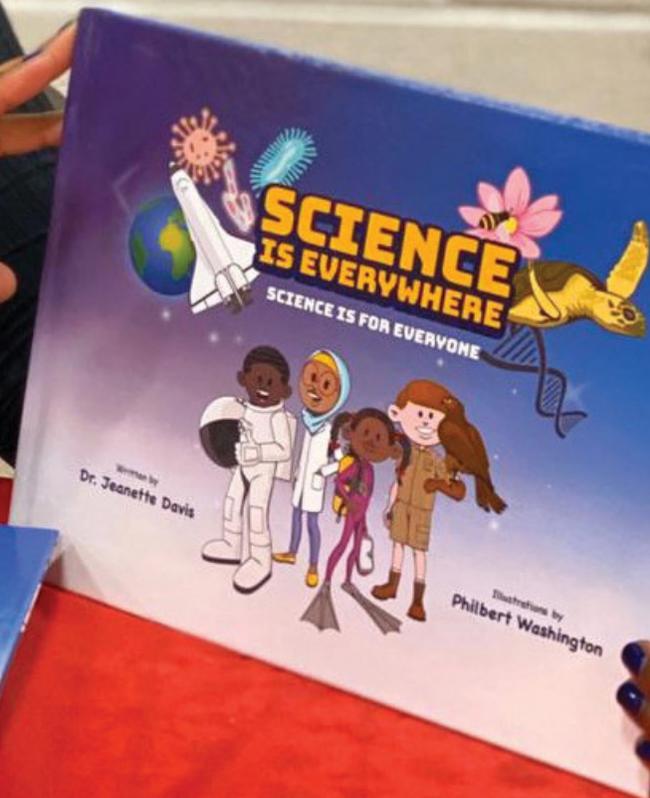
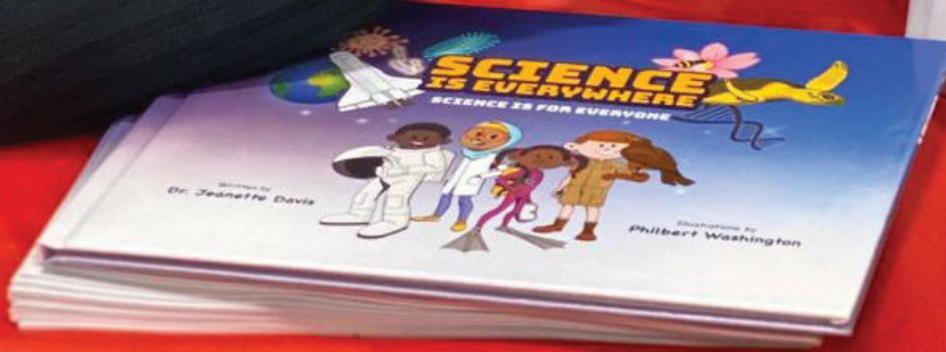
“I think it's innate. I think we love to explore and create. The problem is in how we teach it,” she

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Top photo: Jeanette Davis holds a copy of her book during a book-signing event in Wilmington, Del., in February 2020. Photo: Ki-Jana Hodges

Left: Lauren Watler, a math interventionist, encourages minority students to believe they can excel in math and science. Photo courtesy of Lauren Watler

Right: Taylor Mayes, communications coordinator and field organizer for the Connecticut Roundtable on Climate and Jobs, believes classroom role models and relevant lessons can motivate more minority students to pursue science careers. Photo: Teala Avery



continued. “They (kids) need to know that asking that question is their hypothesis.”

In the book, readers get a glimpse of the natural sciences, such as geology (study of the planet), anatomy (study of bodily structure), botany (study of plants), astronomy (study of celestial objects), and zoology (study of animals). The narrator explains that science is “taking medicine when we are sick. To grow food, drive cars, and fly across the air. Science is cool, science solves problems, science is everywhere.”

The challenge, Davis said, is overcoming minority students’ misguided beliefs that they are incapable of becoming scientists.

Taylor Mayes, communications coordinator and field organizer for the Connecticut Roundtable on Climate and Jobs, agreed, saying more effort should be focused on attracting minorities to the classroom setting.

“For me, the main thing is that we are not paying teachers enough,” said Mayes, whose mother is a science teacher and math coach. “A lot of people going into the STEM (Science, Technology, Engineering & Mathematics) fields go into pharmacy or technology, or other high-paying jobs, instead of science education.”

Canceling student debt could be one way to incentivize potential teachers, she suggested, as could increasing funding for science classes and offering science instruction at an earlier age.

“Children are encouraged by what they see in the classroom,” she said. “They can see themselves in that role at an older age. If we are connecting to the community, making it more relevant, kids will see the purpose.”

Minority students are often limited in exposure and experiences when it comes to science, so it makes sense that they don’t see themselves in an educational role. Currently a math interventionist, Lauren Watler previously taught science and math for three years in Washington, D.C.

Watler found that giving her students the opportunity to present what they’ve

learned in the method that works for them is the best way to reinforce classroom instruction.

“My kids were making presentations every month, whether it’s a Google slide, a skit, a rap. The power of choice ... allowed them to be independent,” she said.

Science is needed in education because it helps students develop the “power of the question,” a skill that is developed through practice and rigor, Watler said. Minority students need to see people who resemble themselves leading instruction so that they know the education field is also an option for them.

“Our kids tend to think that they aren’t smart enough, that science is only meant for foreigners or white people. But science is not a cognitive ability, it’s a mindset that is all based on experience,” explained Watler.

Part of that experience can be found within their own neighborhoods, she said. Kids should be encouraged to think about what is going on outside of their homes — for example, how pollution impacts our breathing or marine life.

“I tell my kids that they don’t have to put themselves in a box. They think they can only be a nurse, not a doctor,” Watler said. “Our kids are limited in exposure and experiences, but once they get a taste ... That’s why I love her (Davis’) book. The characters in the book look like us.”

The 14-page picture book depicts girls with braided pigtails and Afro puffs and boys with short-cropped cuts and blowouts. Their eyes and noses are different shapes. And their skin tone ranges from light tan to dark brown. One girl, a tribute to Davis’ Muslim nieces, is wearing a hijab.

During her education, training, and travel, and her newly developed presence on social media, Davis said she’s noticed a common refrain from people who shared their life stories: “I wanted to be a marine biologist, but I didn’t because I didn’t see anyone who looked like me.”

“For me, my thought was, ‘How do I change that?’ A lot of that really is

shifting the narrative around what a scientist is and what one looks like,” she explained.

During her travels for research, Davis has visited more than a dozen countries, and a tradition she maintains is bringing back souvenirs for her eight nephews and three nieces. They are aware that she’s a scientist, but they often don’t make the connection between who she is and the places she visits, so Davis looks for local books to help her describe the locations. But too often, her searches came up empty.

“I couldn’t find them to articulate what I was trying to explain to them, and if I did, the characters didn’t look like them. When I was in Granada, Spain, I could see Morocco (in northwestern Africa), a place that had so much history of these people of color. But the books had all white people.

“There were no people of color and it was misleading,” Davis recalled. “I wanted books for them to feel included and to know they have contributed to this field.”

To that end, Davis made sure that her book’s illustrations mirrored what she saw in her mind.

“I wanted it to be diverse characters, but look like actual children,” she explains. “I wanted it to be as inclusive as possible with a range of colors. Initially, I was not going to have any white characters, but then I thought ‘If science is everywhere and science is for everyone, then everyone should be included.’ I wrote what the illustrations should look like and they brought it to life.”

The book has gained Davis popularity with young students, who refer to her as “Dr. Ocean,” a name she uses on social media. Although she didn’t have a title or specific characters, *Science is Everywhere: Science is for Everyone* was written in 10 minutes. Davis attributes that to her required academic work on many of the sciences featured in the book — all of which connect to marine science.

“To understand marine science, you have to have a knowledge of a variety of sciences. Ocean science is chemistry, physics, biology, meteorology, botany ...

most of the plants are ones that you can't see," she explained.

"The chemistry of the ocean, the physical changes of the ocean and how it drives the climate, how life relates to the currents. If you look at a globe of the planet, 70 percent is the ocean. You can understand so much of what is going on in the world by studying the ocean."

Davis initially planned to study marine biology and environmental science while an undergraduate student at Hampton University, but she "fell more in love" with marine biology. Every summer she had an internship and she learned how to sail on a boat with a 13-member crew. During one internship, Davis met her mentor, who would eventually become her doctoral advisor.

Davis traveled back and forth to a research site in Hawaii for six years, where she ultimately discovered a bacterium that lives on sea slugs that produces anti-cancer compounds.

"I'm like CSI for the ocean. I study the things that you can't see," she said.

The book has been a conduit for Davis to

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Bottom: Georgina Colon, left, and Jennifer Villa are former students of Susan Meabh Kelly who attended the Society of Women Engineers meeting with her in Minneapolis, Minn., in 2018. Photo: Susan Meabh Kelly



DANBURY TEACHER SAYS DRAWING ON HER STUDENTS' EXPERIENCES MAKES SCIENCE RELEVANT

In teaching earth science and physics at the Henry Abbott Technical High School in Danbury, Susan Meabh Kelly draws on the diverse backgrounds of her students.

"I try to bring in their own lived experience," said Kelly, a teacher for 17 years.

Her students' families come from Central and South America, Jamaica and the Dominican Republic, and many travel to those countries to visit family. In lessons about weather and climate, she asks them to collect data from their homes in Connecticut, and the homes of their grandparents, aunts, uncles and cousins overseas. She recalled one boy sharing that his grandmother's house in the mountains of the Dominican Republic stayed cool, which led to a lesson about how elevation affects climate.

In the technical school, her students are studying trades such as plumbing, heating and cooling. Those subjects are ideal starting points to explore more science questions: why are there high radiation levels in local groundwater? Who's being most impacted by high ozone pollution?

"You need to look at what students are doing and who they are from an asset-based perspective, and get ideas about what will be relevant," she said. "And you have to open up your ideas about who does science."

Her father, a New York City firefighter, did applied science every day at work, and the same is true for many other tradesmen and women. That understanding guides her teaching.

Kelly is a board member of the Connecticut Science Teachers Association and district director for its parent organization, the National Science Teaching Association. Both groups have begun addressing the need to make the teaching of science more appealing to diverse students and ultimately help diversify the workforce of science teachers and science professionals, she said. Two resolutions related to equity passed at this summer's National Congress on Science Education.

"There's a movement towards seeing the benefits of having more diverse perspectives in the sciences," she said. "Historically the people in the majority have been emphasized in science. But science is for all. That's our emphasis."

— Judy Benson

MORE INFORMATION:

"Who Does Science? Using data to explore society, inequality and social justice in the context of science" from *The Science Teacher*, July/August 2020, posted on the website of the National Science Teaching Association:

<https://www.nsta.org/science-teacher/science-teacher-julyaugust-2020/who-does-science>

To read the equity resolutions passed at the National Congress on Science Education, held virtually in July, visit: <https://docs.google.com/document/d/1OdhCYCjtQ8nADJwzbTvBSJ9BmLYLVlsdUlo1TUjJf8/edit>, click "2020 Virtual," then "Equity: Issue Forum II," then "Final Resolutions."



Susan Meabh Kelly

mentor the parents of minority students. Some of them would be sending the family's first generation to college. She shares her experiences as a marine biologist with parents: traveling extensively, authoring White House papers and speaking to student groups.

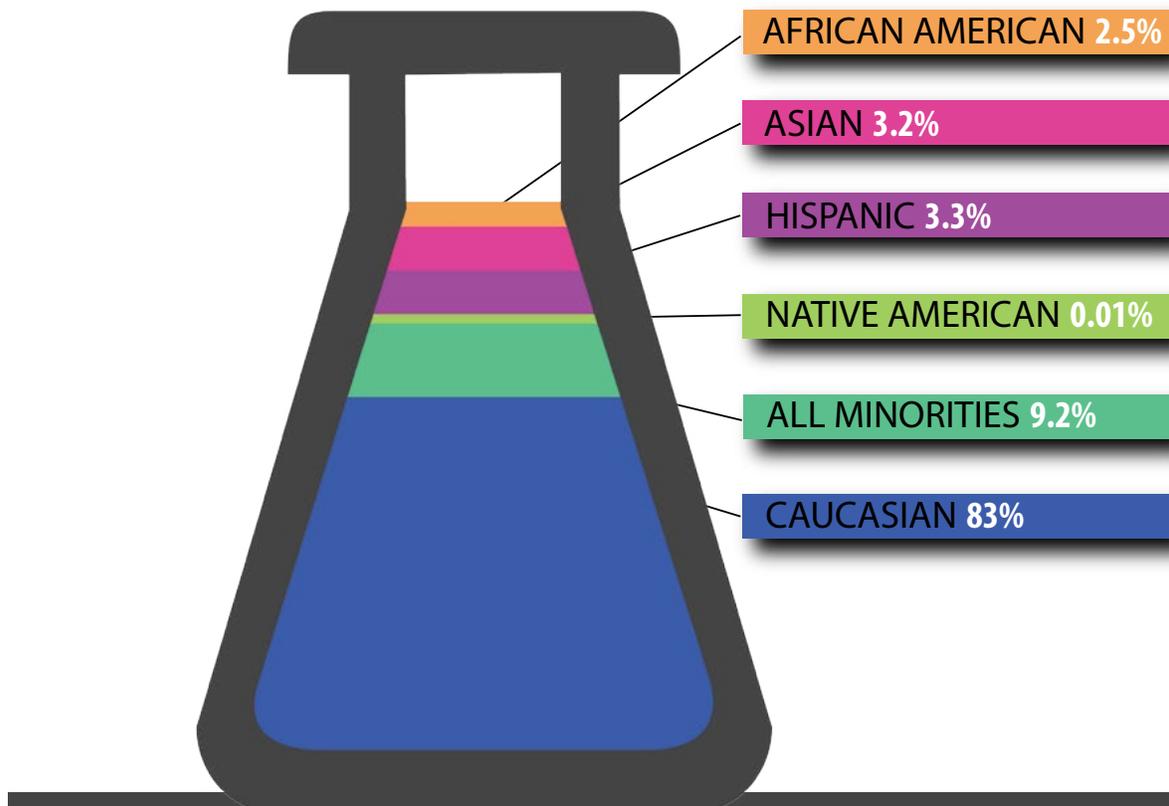
"For me, it's all about being who I am and bringing it to the field," she said. "My job does not require me to write a book, but I felt there was a void and I wanted to fill it."

"...science is not a cognitive ability, it's a mindset that is all based on experience."

EDITOR'S NOTE:

As a past Sea Grant Fellow, Jeanette Davis works with the National Sea Grant Office to diversify the Sea Grant Knauss Fellowship program. Her book, *Science is Everywhere, Science is for Everyone*, is available through your local bookstore, library or online purchase. To learn more about her book and efforts to diversify science—which are personal projects undertaken outside of her current position with the National Oceanic and Atmospheric Administration—visit her website, www.drjeannedavis.com.

RACIAL DISTRIBUTION OF CT SCIENCE TEACHERS



Actual Count: Total 2,135; Minorities 197

Breakdown: African American 54; Asian 69; Hispanic 71; Native American 3; White 1,773

Not Available were 7.7% - 165

The racial distribution percentages for Connecticut science teachers closely mirror the percentages for the state's teaching population overall.

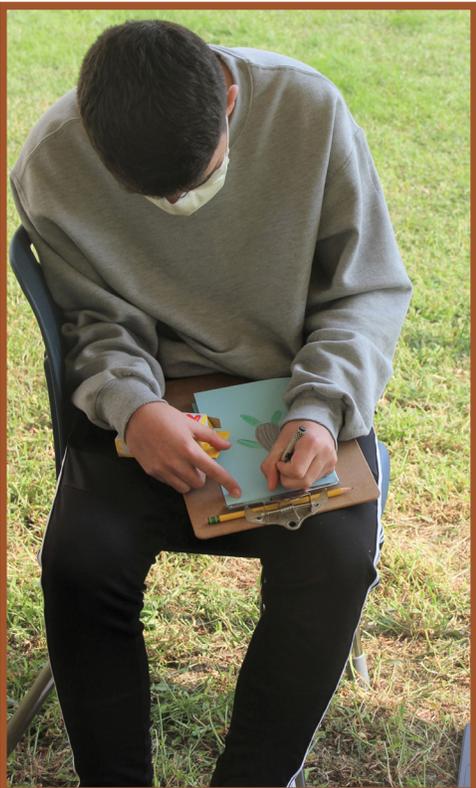
Source: Connecticut Department of Education
Infographic: Maxine Marcy



Student Valery Orrego begins her drawing of an animal from Long Island Sound in the “Think Globally, Act Locally” class at the Joseph Melillo Middle School.



Teacher Maureen O'Day, left, works with eighth grader Sophia Santiago as Melissa Cangiano, restorative practices specialist, looks on during an assignment to use what they had recently learned about Long Island Sound in an art project.



Student Zach Gutierrez works on a drawing of a sea turtle in the “Think Globally, Act Locally” class. All photos: Judy Benson



Alain Ojedas, an eighth grader in the “Think Globally, Act Locally” class at the Joseph Melillo Middle School in East Haven, works on assignment about Long Island Sound on Sept. 18. The assignment required students to incorporate information from a presentation given the previous day by Connecticut Sea Grant Associate Director Nancy Balcom into a drawing and message about what they had learned.