

Photonics struggles to bring more women into its ranks

Early classroom experience called key to increasing girls' interest in science

By GINO FANELLI

The hard sciences, otherwise known as STEM (science, technology, engineering and mathematics), have long been devoid of significant female representation. According to the federal Bureau of Labor Statistics, women in most science and engineering fields make up only a fraction of the workforce. In 2018, women accounted for 15.9 percent of architecture and engineering occupations, with a representation of only 10.9 percent among material engineers. Across the board, from chemists to mathematicians, similar trends are found. When it comes to leadership positions, women are also in the minority, with 26.9 percent of chief executives, across all fields, identifying as women in 2018.

Locally, the photonics/optics field has seen a few women in its ranks, notably Boulder, Colo.-based Double Helix Optics, which is led by co-founder and CEO Leslie Kimerling and took the top prize among companies in the first Luminate NY accelerator competition last year.

"We have to start at a much earlier age than we ever thought we needed to," said Alexis Vogt, endowed chair and associate professor of optics at Monroe Community College. Vogt has a 6-year-old daughter and she visits her classroom regularly to do science demonstrations, particularly focused on optics, "but I'm promoting STEM fields in general."

Women's attitudes toward STEM fields start at a very young age, Vogt said. Girls tend to feel excluded from science—that certain classes are not for them. According to a 2018 study by Microsoft, 73 percent of girls in grades 5-12 knew how and why STEM careers were important when they knew a woman in a STEM field, but that percentage drops to 53 percent when they didn't know a woman in STEM. Girls and young women were more likely to want to be involved in STEM when they felt included in STEM.

For Vogt, her student base is overwhelmingly young men. She based her 2018 keynote speech at Photonics West's Women in Optics



Vogt



Ramanujan

program on women in STEM. Dubbed "Raising the Bar," Vogt's speech revolved around her experience as a mother, wife and optics professional in the modern world.

MCC collaborates with a number of area high schools on a dual enrollment optics program, and Vogt recently visited Irondequoit High School.

"I was pleased to see that about a quarter of the class were females. That sounds ridiculous to say that I was pleased that a quarter of the class was female, but that's where we are right now," Vogt said. "We need more women to enter this field of optics, and the numbers just aren't there yet."

As optics, already a burgeoning industry, becomes more important and more lucrative, Luminate NY managing director Sujatha Ramanujan says we need to change our approach on how we teach scientists, how young girls are brought to the table and how we teach students STEM fields from a very young age.

Ramanujan, who came to Luminate NY with 30 years of experience in the optics industry, said girls are discouraged from entering STEM fields by behaviors that steers them away from the sciences. Through subtle comments like, "'we only put so many people in this class' or 'we're going to teach them at a different pace' ... you have told that child they aren't good enough at a time where they internalize it, and I think that is deeply, deeply wrong."

Ramanujan speaks of being one of the only women in her college STEM courses and later about being the only woman in the room as she moved into her work as a tech entrepreneur. On an industrywide level, she felt generally accepted and respected by her colleagues, with some exceptions here and there. But when it came to seeking financial support from investors, she tells a different story.

Sexist attitudes "came later in my career, and it had less to do with the science of things and more to do with money, senior positions and raising funds," Ramanujan said. "And for various reasons, perceptions of women's ability to run a business or sit in very senior roles—that part has not changed as quickly as the science has."

From Ramanujan's experience, being a woman in the realm of science is easier to accept because science is verifiable; it's based on demonstrable facts. The world of venture capital is different. Opinions can vary on how a business should be run, and that's an environment where prejudices can take root. Between 2011 and 2013, just 3 percent of venture capital raised for startups went to female CEOs, according to a study by Babson and Wellesley colleges which surveyed over 7,000 companies. Eighty-nine percent of venture capital firms had a man making the chief financial decisions.

"That's where I had to struggle sometimes, to be second in command when I should have been first, or I was first and pretending to be second so that outside of my immediate organization we got the recognition we wanted," Ramanujan said. That was also true "on an international level when we were traveling to countries that maybe were not so accepting of women in senior positions— that part was tricky."

None of these problems are unique to optics. But as a rapidly growing science that promises lucrative careers and has a fundamental visibility problem, it's easy for young women to overlook photonics as a part of their future.

Both Vogt and Ramanujan agree that change needs to start in the classroom from a young age and must continue through adulthood. Role models should be available, a "yes you can" approach to teaching must prevail and, above all else, the faulty preconceptions of what it means to be a woman in science need to be broken.

"So many times I was the only girl in the classroom, and I'm by nature not shy, but I was then. I would sit in the back and be real quiet," Ramanujan said. "I loved it enough to do it," but for other girls who may not have developed the interest yet—they "just don't go."

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