

ENABLING RESEARCH EXPERIENCES

A pioneering program prepares underrepresented **UNDERGRADUATES WITH DISABILITIES** to be leaders in science

MATT DAVENPORT, C&EN WASHINGTON

KARL S. BOOKSH had taken hundreds of hits playing high school football. He says there was nothing special about the last hit he took during a game of flag football, at least not at first.

The play ended like many before it. Booksh, then a college freshman, collided with the ground. But then he did not get back up. The impact had broken his neck.

Booksh has been in a wheelchair ever since, in which time he finished his undergraduate degree in 1990, earned his doctorate, completed a postdoc, and ascended through the faculty ranks in chemistry. He refers to his injury as only a minor setback. “I was too dumb to know I was disabled,” he says.

Today, as a professor at the University of Delaware, Booksh has an acute awareness of his disability, or rather of his role as a leader with a disability.

Booksh knows very few people with disabilities who have navigated postsecondary school to rise to prominent positions in science, technology, engineering, and mathematics (STEM) fields. This inspired him and his colleague Sharon Rozovsky to launch a 10-week summer research program for undergraduates with disabilities.

Sitting in an office with Rozovsky, Booksh points to a graph showing the percentage of doctoral degrees held by different underrepresented groups in STEM disciplines during the past three decades. The proportion of doctorates earned by black and hispanic students has grown marginally, but visibly. The percentage of Ph.D.-holders with disabilities has remained flat.

Many students with disabilities graduate high school, but Booksh says they can be overwhelmed by the challenges of college life. Few disabled students go on to graduate school, fewer still will take postdocs, and Booksh says he knows of very few who have reached faculty status.

“We’re perpetuating this lack of achievement,” he says. “High school prepares these students for jobs in the service industry. We want people with disabilities to learn how to go into leadership roles.”

Booksh and Rozovsky are working to help guide students with disabilities into these roles by starting where the attrition

ADVOCATES Booksh and Rozovsky established Delaware’s REU program for chemistry students with disabilities.

begins—in college. They brought eight such undergraduates, most from smaller, teaching-focused schools, to the University of Delaware, a major research institution, to better prepare them for their collegiate careers and beyond.

Funded by a National Science Foundation grant, this program is among the first Research Experiences for Undergraduates (REU) designed specifically for chemistry students with disabilities. About half of the students in the program have physical or sensory disabilities; the other students have what are commonly classified as psychosocial or neurodevelopmental disorders, including autism and Asperger’s syndrome.

But helping these students become leaders doesn’t mean shoehorning them into a particular lab, project, or graduate school, Rozovsky says. It means giving them the freedom and guidance to find where their interests and talents lie.

“Our goal wasn’t to glorify grad school,” says Rozovsky, an assistant professor of chemistry and biochemistry. “We wanted to give them a chance to be independent and to let them explore if research is their passion.”

ON THE FINAL DAY of this REU in mid-August, the University of Delaware’s sun-drenched walkways are mostly deserted, as is the emerald turf just outside Clayton Hall. Inside Clayton, however, a university-wide poster session features the work of hundreds of undergraduates, who are busy hanging posters and devouring free bagels. Chelsea Cook, a physics major who will be a senior at Virginia Tech this fall, stands calmly in front of her poster showing how she used density functional theory to model electron transfer between molecules used in solar cells. “It’s really cool,” she says, smiling, “even though I’m doing a lot of chemistry.”

After she graduates, Cook wants to study astronomy, and she knows that participating in an REU bolsters her chances of getting into one of her top-choice grad schools. But she had a hard time connecting with an adviser who would take her on. Cook is almost completely blind.

“We want people with disabilities to learn how to go into leadership roles.”

It was Booksh who put her in touch with Lars Gundlach, a physicist in Delaware's chemistry department. Cook says that Gundlach was willing to help her work through the obstacles presented by her disability.

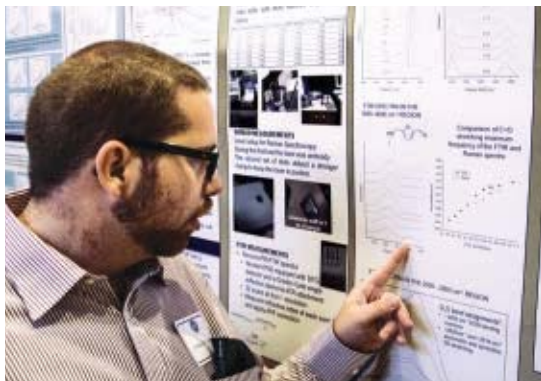
Cook has some sight but says she cannot use it functionally. Building molecules in ChemDraw, for instance, is out of the question. So, with the help of a program that reads the content of a computer screen aloud, she learned how to load molecules into her simulation software by typing in commands with her keyboard. She had to study manuals that were more than a decade old to do this, she says laughing, but it was worth it to get meaningful data and to show that research science is an option for students with limited or no sight.

Although there have been a number of vision-impaired physicists, hardly any have earned their degrees recently. Cook hopes she can help change that. "Hopefully, I'll get my Ph.D.," she says. "Then there are

Still, only this program and one at James Madison University that accepts deaf students advertise that they will accommodate students with disabilities, says Tyrone D. Mitchell, a program director for chemistry REUs at NSF. The JMU program is not currently funded by NSF. But Booksh, Rozovsky, and the students who spent their summers in Delaware believe

their program can inspire more research universities to become more accessible to students with disabilities.

"There should definitely be more programs like this. I hope it helps show that we are not defined by our disabilities," says Scarlett Tucker, an undergraduate from Oklahoma State University. "They don't affect our ability to think scientifically." ■



MATT DAVENPORT/C&EN

ONWARD Joshua McNeely will continue researching as an undergrad at his home university, the University of Missouri, this fall.

three or four Braille-reading physics majors coming up behind me."

The other students share a common sentiment about the program—that it was fantastic—and have similar plans for their

future so. All of the students are now considering graduate school. And most have lined up or are lining up research positions for when they return to their home universities this fall, says Joseph Smith, a graduate student mentor for the REU program.

He thinks the program will help them in the future, but he believes the students came in with the requisite curiosity and determination. "The program was really student-driven," he says. "I see a lot of them going on to be really successful."

Biotransformation and Flow Chemistry under one roof


Greener, Safer, Cheaper

Let Asymchem combine Biocatalysis and Flow Chemistry into your API process. From route development to commercialization, all on one site.


- Enzyme discovery, optimization, screening, and production
- Immobilization
- Flow systems
- Application into integrated process

All work performed in-house


Simplify your supply chain




Flow Chemistry Pilot Plant



Fermentors



TJ2 cGMP plant



Asymchem Laboratories (Tianjin) Co. Ltd.
US sales office: (919) 468-3884 www.asymchem.com