

Suitcase Full of Optricks Helps Math, Science Go Down

IRVINE, Calif., Jan. 16, 2007 -- In the past few years, a quiet transformation has been taking place in schools from coast to coast: Students of both sexes have been learning about math and science -- and liking it.

"We don't like to teach anything that's not fun -- that's the key, to make it fun," said Donn Silberman, founding director of the Optics Institute of Southern California (OISC), an Orange County-based nonprofit organization that "seeks to foster the curious scientist, the artful mathematician and the creative engineer in every student, regardless of age."



Students investigating the spectrum with the Optricks 'Rainbow Peephole' Theme packets.

Silberman said, "We have to turn the whole concept of how you teach optics and science around. People have been teaching optics for hundreds of years but haven't been very good at it. They make math hard; they make it dry and intimidating. (That "method" of teaching probably especially discouraged a lot of girls, he added.) So we start off by making it fun and interesting, then take them a little deeper into math and science and theories. "

OISC promotes math, science and engineering education via the use of optics and related technologies and phenomena using a hands-on, student-centered approach. One of a few organizations across the county that promote optics education, it is affiliated with the Optical Society of Southern California (OSSC), a chapter of the OSA, which runs an education outreach program for grades K-12.

Students look through a lens from the "Magic Dots" Optricks Suitcase theme kit. Here they can see the magnified images of "dots" that make up color printed images. (OptoSigma consistently donates magic dot lenses.)



One of OISC's most popular activities, the Optricks Suitcase, originated at the University of Rochester's Institute of Optics and the Rochester OSA chapter. That program, which targets middle-school students, was developed by Steve Jacobs, a senior scientist and professor of optics and chemical engineering at the university's Center for Optics Manufacturing, part of a nationally supported research and development alliance. OISC distributes Optricks Suitcases to area teachers and technologists for use in after-school programs or incorporated into science classes. The kit has everything a teacher

needs to make about three presentations to about 25 students, including 174 theme packs. The kits challenge students to ponder questions such as "Where do colors come from?" by making a polariscope or making Slinkys vibrate like a wave of polarized light; or "How does printing work?" using magnifying lenses to look at printed material. In one Optricks suitcase exercise, participants are asked to place a "magic patch" on their wrists to perform a "vampire test" as a demonstration of selective reflections by liquid crystals



painted on black paper. (A free Periodic Table of Elements used in the Optricks Suitcase can be downloaded at: <http://www.oisc.net/Periodic%20table%20EniGcolor.pdf>.)

Volunteer Brian Monacelli, an OSSC counselor, mans the Optricks table during a Family Day event at the UC Irvine Beall Center for Arts + Technology.

One of OISC's most popular programs is its Optricks Days events -- organized "with the help of many friends" from the OSSC, Silberman said. On Optricks Days, these helpers, or "Optricks apprentices," work their magic among hundreds of guests at the Discovery Science Center in Santa Ana.

Silberman said many of the OISC's efforts have been inspired by Murty V. Mantravadi, aka "the Wizard of Light," an OSA Fellow and retired Northrop Grumman research engineer. Mantravadi received his PhD from the University of Rochester's Institute of Optics, where he was also a faculty member. The OISC also provides instruction on optics education to teachers through "Hands-On Optics," a program sponsored by OSA, SPIE and the National Optical Astronomy Observatory that promotes public awareness with events like Optricks Day and through Optricks presentations and workshops.

Behind all of these efforts is, of course, the growing awareness of an increasing shortage of scientists in the US. The US Department of Education reported in June 2006 that American high-school students are consistently outperformed by those from Asia and some European countries on international assessments of mathematics and science (The Condition of Education 2006 report, National Center for Education Statistics). A number of optics companies are involved in their own initiatives to ensure a future supply of technicians or are working with organizations like the OISC to prepare students to go directly into industry.

Optics Institute of Southern California Director Donn Silberman, here in the guise of an "Optricks apprentice," waves a magic wand that blinks in different colors while making an Optricks Days presentation about movement in space and time.



OISC relies on corporate sponsorships to supply equipment and expertise for Optricks Suitcase and its other outreach efforts. For example, Silberman said, OptoSigma has donated lenses -- "literally thousands of them" -- to the program; Newport Corp. also donates equipment and was instrumental in organizing the OISC's October 2004 Speed of Light exhibit (based on the Michelson-Morley experiment conducted at the Irvine Ranch in the 1930s) at the Irvine Civic Center.

Silberman, who is also a member of OSSC's board of directors, said OISC works closely with the South Orange County Community College (SOCCC) district. Last year, OISC was collocated with the Irvine Center for Applied Competitive Technology, formerly the Irvine Valley College Laser Electro-Optics Technology Program, in a new facility managed by the SOCCCD's new Advanced Technology and Education Park. The facility has a fully equipped college-level classroom; a laser, optics and fiber optics teaching lab; and an educational optics fabrication shop.

Silberman said one of the OISC's goals this year is to work more with high-school students. "They can come to our community college optics program, then go to a university and include optics in their studies," he said. "For outreach, we have focused on younger kids; but we have to keep them involved through high school, when we have these things called hormones that go crazy, and you lose them -- to sports, boyfriends/girlfriends and everything else media and society puts in their brains -- and they just forget about science."

To help counteract such obstacles, he said, he will try to form optics clubs for via after-school programs.

Silberman learned the value of hobbies at an early age. He attended Beverly Hills High School, which has its own planetarium. "My mother and I moved to a little apartment just inside the city limits so I could go to this school," he said. Required to take a science elective in his junior year, he offhandedly chose astronomy. "I got sucked into it and decided to become an astronomer. I built a telescope my senior year." He even became an assistant to his astronomy teacher (with whom he is still in contact, Silberman said).

Later, he was accepted as an astronomy major at the University of Arizona, in Tucson -- where his father lived -- and landed a job as a tour guide at the university planetarium. But he said he found the astronomy program too competitive and restrictive.

"My freshman astronomy teachers made it hard," he said. "They said there were few jobs, and it seemed like they were determined to weed students out."

He switched his major to engineering physics, got involved with the Society of Physics Students, taught freshman physics labs, worked at the university's Optical Sciences Center and "had a great time," he said.

Silberman has more than 20 years of management and technical experience in various optics-based businesses, with a number of patents and publications to his credit. He has an extensive background in product management, including conceptualizing, research

and development, quality assurance, product manufacturing, marketing and sales. He has been employed as a senior R&D optical engineer for Johnson & Johnson's IOLAB Corp. in Claremont, Calif.; as operations manager, micro-optics, for Corning Inc.'s Advanced Photonic Technologies group in Garden Grove, Calif.; and engineering systems manager in the RAM optical instruments division of Newport Corp. in Irvine. He was also responsible for marketing Newport's optomechanical product line and introduced color product photos into the Newport catalog. In 1994, he received a master of science degree in technology management from Pepperdine University.

"I also had this thought of starting an education outreach program," Silberman said, "and friends and colleagues from around the optics community encouraged me." He quit a job at the Gemological Institute of America to start the Optics Institute of Southern California in February 2003. Later that year, he became affiliated with his fiscal sponsor, Community Partners of Los Angeles, an incubator for nonprofits. He now also works for Physik Instrumente (PI) as a senior applications and sales engineer; he said PI is "very supportive" of his work with OISC.

Silberman's enthusiasm for science has duly influenced his son, Michael, who is now a fourth-year student working on a degree in applied math at Columbia University and is applying to graduate schools. In the summer of 2005, Michael was involved in an OISC summer program at the University of California, Irvine's Gifted Students Academy, where he taught astronomy and physics programs his father had started two years before.

"He mastered the program and made it better than what I had done," Donn said. He said they also share an interest in integrating science and technology with art and humanities, to use art to describe the science of various phenomena -- something he is pursuing through the OISC with The Beall Center for Art + Technology at UC Irvine, where OISC participates in Family Day events.

"The whole art thing has been pulling on me in huge ways from the beginning," he said. "The Beall Center has artists that integrate science and technology into their art and scientists and engineers who use art to describe the science of various phenomena; so the merger of art, science, society, technology, the environment, activism and politics are all mixed up together. They're doing it at a few universities (one of the graduate programs his son is interested in is UC Irvine's Arts Computation Engineering (ACE) graduate program), and it's what we do with the kids.

"There's so much to do, it's such a broad base," Silberman said. "We use optics as our science to focus on then narrow it down: How does optics impact our society? We explain it with exhibitions and through art and use artists to help us do that. It's just fantastic."

For more information, visit: www.oisc.net

This article appeared on:

<http://www.photonics.com/content/news/2007/January/16/86016.aspx>

© 1996-2006 Laurin Publishing. All rights reserved.