

Local firms teamed with Monroe Community College to hold events, right, that introduced high school students to optics. Below, local businessman Tony Marino helps move equipment into East High School's new Optics Fabrication Lab.

"I didn't hear anything for a few weeks, and they called and asked me to come in.

"I was ambushed. It was a full-blown interview, with five or six people—I knew all of them—across the table from me. Three days later, I received a letter welcoming me to the faculty and telling me that I started in two weeks."

With no time to prepare, Cobb offered to teach a lab instead.

The school still had only a handful of students, but it was upgrading on the fly. Phillips wanted access to modern equipment, but had no money. So she asked photonics cluster members for help. One company let the college hold a class in its factory.

"We hired their engineers as adjunct faculty and got a world-class optical machining course. That's how closely they worked with us," Phillips said.

Student numbers began to rise, but not fast enough to offset costs. Phillips found herself reselling the program to the new college presidents and provosts as administrations changed.

"Industry needed our graduates," Phillips said. "They could get good jobs, and we were doing what community colleges were supposed to do. But the better story was to show how local industry leaders were in it with us."

She remembers taking a new president to eight different optics companies in one day, introducing presidents and CEOs, and also MCC graduates. Each stop showed the local commitment to the program. She also brought around science and technology faculty, so they could learn about opportunities for optical technicians.

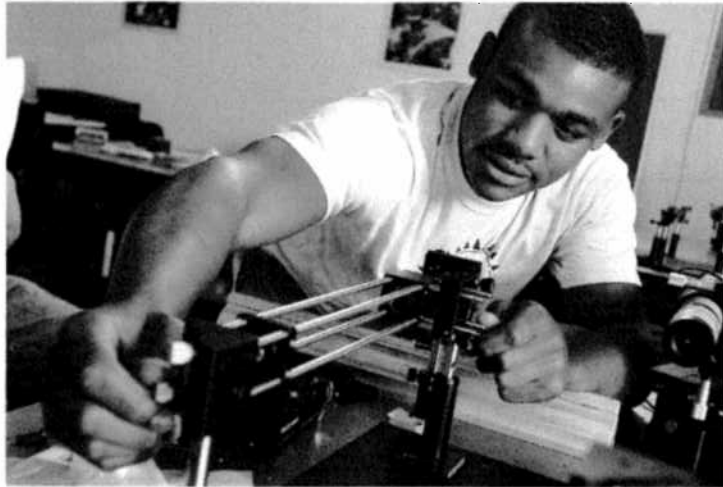
The cluster tried to generate interest. It sent press releases about expansions and new companies to local newspapers, and gave talks about opportunities in optics. Members opened their shops for tours. They held events for high school students at the community college campus.

To really fill seats, MCC needed a pipeline from local high schools. All it took was a teacher upset about the time it took for one of his students to get eyeglasses.

THE NEXT GENERATION

Paul Conrow was teaching physical sciences at Rochester's East High School. A few days into the new term, he rearranged his class. Cedric, a tall, awkward student, moved from the front to the back of the classroom. His behavior plummeted.

Conrow quickly diagnosed the problem. Cedric saw nothing from the back of the room and was easily dis-



tracted. Conrow called Cedric's mother and the school nurse, yet it took until mid-February for Cedric to get glasses.

"Rochester is one of the poorest school districts in the nation," Conrow said. "It's not like the mom didn't care. She worked and didn't qualify for free glasses, and like the parents of many urban students, she didn't have the time or money to make glasses priority."

While Conrow was glad that Cedric got his glasses, he was upset it took so long. "So I did what any hot-blooded American male would do," he said. "I made a PowerPoint."

The presentation outlined a plan for a school workshop that would teach students to make eyeglasses for other students. Conrow's best friend at the school, a biology teacher who spent three years as a Navy optician, would teach the course.

Conrow presented the idea to the district superintendent, who had been principal in the only school in America with a student eyeglass program. He introduced Conrow to teachers at a sister high school where members of the cluster were helping to plan a precision optics program. There, he met Battley.

"Tom took me on tours of these precision optics factories," Conrow recalled. "I saw that 80 percent of the people were skilled technicians. I thought, 'We could train high school kids to do this level of work.'"

He put that thought on the back burner while he put together a \$30,000 proposal for a school optician shop. Meanwhile, the state ordered Rochester to close East's sister school. That school had already lined up a \$150,000 federal technology grant that East High inherited. Conrow learned about it



Monroe Community College students receiving expert instruction in the optics lab

when the principal invited him into his office.

"He said, 'We need a budget by tomorrow at 5 p.m. Otherwise, we'll have to order laptops and smartboards. Can you spend it?'" Conrow said.

Conrow immediately got on the phone with Battley, Cobb, and others he had met. The next morning, he went to a diner with Jim VanKouwenberg, a training coordinator at OptiMax Systems, a specialist in complex lenses. Together, they pored over catalogs and put together an optics lab.

They had only weeks to spend the grant money. Fortunately, Tony Marino, president of another optics manufacturer, Advanced Glass Industries, also dealt in used equipment. He fulfilled the shopping list by the June 30 deadline.

"For every dollar we spent, Tony gave us five dollars of machinery," Conrow said.

That happened in spring 2010. On the last Friday in January, Conrow received an email from the state. East High School had won a \$466,666 grant for its optics initiative. The state had forgotten to notify him in August and, naturally, everything was due immediately.

By then, Conrow knew where to turn for help. And today, East High School has a world-class lab capable of making industry-grade optics. The vision care class is also up and running.

"We have to aim very high, so that we can train kids with the exact skills that employers want and need," Conrow said.

Conrow is now recruiting 10th graders and showing them Rochester's optics industry. Instead of the dirty, noisy factories they expect, he takes them to clean workplaces with polished white floors. Some come

back and sign up for optics classes. They may take jobs when they graduate or enter MCC's optics program. When they get there, the students will already have college credits from their high school courses.

The photonics cluster is reaching out to other high schools to create similar programs. As the pipeline builds and word of the MCC's program grows, the school is receiving job postings from optics companies in other states.

For several years, Conrow joked that his high school workshop was better than MCC's labs. That will change. The community college recently landed a \$500,000 grant for new equipment from the Corning Foundation, whose parent, Corning, makes optical glass and has close ties with the cluster. Sydor matched it with a \$250,000 grant of his own.

At University of Rochester and Rochester Institute of Technology, optics programs continue to turn out talented scientists and engineers who quickly find jobs.

Meanwhile, the Rochester Regional Photonics Cluster has morphed into New York Photonics, with additional clusters in Buffalo, central New York, Albany, and Long Island. It now represents hundreds of optics and photonics companies throughout the state.

Of course, it is never clear sailing. While Rochester survived the great recession, its manufacturers suffered. This included Bausch & Lomb. Valeant Pharmaceuticals bought it last year, moved its headquarters to New Jersey, and downsized its operations.

Paul Ballentine, who analyzes technology opportunities as deputy director of University of Rochester's Center for Emerging and Innovative Sciences, sees plenty of upside. Light-based systems are continuing to grow, but Rochester's optics community will have to reinvent itself to thrive.

"They have got to recruit more companies that do integrated photonics, combining display and electronics, to Rochester," Ballentine said. "We've got the highest concentration of optic companies in the country. It's a good base to build on."

And, he might have added, one that knows how to adapt to change. **ME**

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