PHOTON2 NEWS

A Project of the New England Board of Higher Education (NEBHE)

FALL 2004 www.nebhe.org/photon2.html ISSUE TWO

TABLE OF CONTENTS:

PHOTON is a project of the New England Board of Higher Education (NEBHE), and is funded in part by the Advanced Technology Education (ATE) program of the National Science Foundation (NSF). For more information, please visit our web site: www.nebhe.org/photon.html. You may also contact the program staff at NEBHE:

Fenna Hanes, Senior Director, Office of Programs
617/357-9620 x129 fhanes@nebhe.org
Chuck O'Toole, Administrative Assistant
617/357-9620 x113 cotoole@nebhe.org
NEBHE ■ 45 Temple Place ■ Boston, MA 02111

PHOTON2 Team Leads Cohort One Introductory Workshops

This spring brought new growth and activity to PHOTON2, as the project's first cohort officially got underway. Participants took part in a series of workshops to introduce them to PHOTON2's goals and online course delivery system.

The workshops were held all around the country, starting with the New England alliance meeting at Springfield Technical Community College in Massachusetts and ending at Pima Community College in Tucson, Arizona. In between, the team also visited Kittanning, Pennsylvania, and Frisco, Texas.

Continued on page 4

From left, co-PI Judy Donnelly demonstrates the PHOTON2 lab kit as Centennial HS teacher Derek McDowell, co-PI Nick Massa, and CCCCD professor Wayne Jones look on.

Portrait of a PHOTON2 Alliance: Pima/Desert View

Over the next several issues of PHOTON2 News, we will present a series of articles, each of which looks at one PHOTON2 alliance in depth. Each article will focus on one period in the development of a PHOTON2 alliance.

In this issue, we look at the Pima Community College alliance, in Tucson, Ariz., as an example of the early stages of alliance-building and course participation.

The Pima alliance began with a conversation between PHOTON2 PI Fenna Hanes and Dr. Robert Breault at the Education & Training in Optics & Photonics (ETOP) 2003 conference, held in Tucson. Breault, the founder of Tucson's Breault Research Organization, Inc. He has acted as an industry advisor to Arizona's community colleges, helping improve the schools' response to the needs of local businesses.

Continued on page 5

Lazaro Hong (l) and Chien-Wei Han of Pima Community College showcasing the Pima semiconductor manufacturing laboratory.

CTDLC: Creating New Pathways in Online Distance Learning

It's been an exciting ten years since the Internet started changing the way people think about communication. If the commercial benefits of the medium have gotten most of the press, its effects on education have been no less revolutionary. Online distance education has grown steadily since the mid-nineties and continues to reshape the higher education landscape.

CTDLC executive director Ed Klonoski

Project PHOTON2 is part of that transformation, moving technical professional development for teachers into cyberspace. A major partner in making that transition possible is the Connecticut Distance Learning Consortium, or CTDLC, a state organization created in 1996 to facilitate online distance learning endeavors in the Connecticut higher educational system. CTDLC is working with Three Rivers Community College and the PHOTON2 team to develop an effective online learning tool to teach photonics technology.

Recently PHOTON2 spoke with Ed Klonoski, executive director of the Consortium. Klonoski, a former professor of Composition and Rhetoric at the University of Hartford, has headed the CTDLC from its beginnings as a "What if?" in the minds of Connecticut education leaders.

In those days Connecticut's public colleges and universities were eager to offer distance learning (DL) options and reach students who might not be able to get to a physical campus regularly. "Our target customer was the woman in her 40s, working with a family, who hadn't finished her degree," says Klonoski. "Through distance learning she could take the classes she needed without having to add a long commute to her schedule."

But with so many schools wanting to develop DL programs, lawmakers were leery of funding redundant and possibly contradictory programs on several state campuses. The CTDLC was conceived as a way to consolidate and streamline Connecticut's budding distance learning systems. CTDLC would work as a partner with Connecticut schools and help them develop self-sufficient DL programs, with an eye to intra-system compatibility.

That initial idea paid off—for five full years the Consortium and its partner schools saw 70% annual growth in their users—and now the organization has evolved into an award-winning multi-service agency that works with clients from both the public and private sectors. The Consortium does everything from web design to server hosting, and has gathered a staff skilled at finding creative solutions to the challenges posed by online instruction.

None of this came easily. With such new technology, Klonoski says, there was no road map to follow, and the CTDLC made most of it up as they went along.

What is more, the new medium has a funny way of rewriting what rules do exist. The new flexibility of online courses has led the CTDLC and their clients to reconsider many aspects of the traditional lecture-based college course.

"A course-semester-section arrangement makes sense when you are meeting in a building, but DL makes those models unnecessary," says Klonoski. "Early on we tried to match classroom discussion formats online, but we found that a DL environment actually had advantages over the old way." One example he gives is threaded discussion boards, which allow more introverted students to join in a debate that they might prefer to sit out in a classroom.

"The question has been," he says, "given that you have no real-time pressures, how do you make a learning environment that is not

Continued on page 3

CTDLC, continued from page 2

teacher-centric? We need to move away from auditory learning models developed for the benefit of well-spoken professors and focus on what helps the student learn."

At first glance Klonoski does not seem a likely candidate to lead a revolution against "well-spoken professors." He did, after all, start out as a teacher of rhetoric and writing. His transformation into an online ed enthusiast was gradual—he began teaching writing in a classroom using Macintosh computers, then moved on to doing technology training for faculty at the University of Hartford. Eventually he decided he was ready to give up teaching, and when a job opened in the IT department at Charter Oak State College, he put in his name and got the position. Eventually he became Director of Information Technology, where he conceived the idea of the Consortium.

His combined experience in education and computers has helped create a program uniquely attuned to complexities both technical and pedagogical. The CTDLC promotes distance learning both directly, by hosting conferences and council meetings of the Consortium's members, and indirectly through the good word-of-mouth that comes from finding innovative solutions to their clients' problems.

One of the keys Klonoski espouses is a constant focus on teaching clients while serving them. In conversation he returns again and again to the idea of partnership with clients—developing a long-term relationship with them so that they come back to CTDLC with their future projects. "If you take a corporation with you from A to B in technology," he says, "they will ask you to go with them from B to C." The Consortium has also made a habit of taking on projects that they can learn from, offering much lower rates to potential clients so they can take challenging work and expand their experience base.

Chuck Russell and Negussie Tirfessa of Connecticut's Manchester CC explore the PHOTON2 online course at the New England Alliance's intro workshop.

This philosophy of partnership has helped the CTDLC to cultivate a growing stable of private clients in addition to their original customers in the state college system. Klonoski's eventual goal is to have the Consortium revenue-independent, supporting itself without help from the Connecticut state legislature. ■

SPIE Awards Education Grants to PHOTON2 and Three Rivers Community College

This spring SPIE—The International Society for Optical Engineering awarded the New England Board of Higher Education a $2000 Educational Grant in Optical Science and Engineering to allow PHOTON2 co-Principal Investigator (co-PI) Nicholas Massa to attend the Society's annual meeting. This year's meeting was held in Denver, Colorado, from August 2-6. Massa is a member of the Society's Education Committee and reported to the group on PHOTON2 activities.

Grant funds remaining after Professor Massa's trip were used to contribute toward the travel costs associated with bringing the PHOTON2 PIs to its annual National Visiting Board (NVB) meeting. PHOTON2 scheduled this year's annual NVB meeting to coincide with SPIE's September Photonics North Conference in Ottawa. This arrangement worked well since co-PIs Donnelly, Massa and Washburn were scheduled to make presentations at the conference and a number of the NVB members were scheduled to attend the SPIE conference.

The Society awards $250,000 each year in scholarships to outstanding student members and grants to institutions that provide optics and photonics education and innovation.

In addition, PHOTON2 co-PI Judy Donnelly, in her other role as professor of physics at Three Rivers Community College, was awarded a separate SPIE travel grant of $4,970 to send students to TRCC's "Optics in the Summertime" course, taught by TRCC professor Charles Margolies. Nine high school students worked on a 101-level course in optics. This is the third year the SPIE-sponsored course was offered. For the first time this year, applicants were turned away; Donnelly says they start receiving applications for the summer class in January.

The 2004 "Optics in the Summertime" class at Three Rivers Community College. Instructor Charles Margolies, rear center; lab technician Stu Cohen, far right.

The SPIE grant also provided students with copies of Project PHOTON2's introductory textbook, "Light Across the Spectrum: An Introduction to Photonics Technology." ■

Cohort I Workshops, continued from page 1

By the end of May, more than thirty teachers and counselors had taken the WebCT site out for a test drive and were ready to begin the course in September.

Following the Springfield workshop in April (covered in the Spring 2004 issue of PHOTON2 News) the team headed out to the western Pennsylvania countryside, home of Indiana University of Pennsylvania at Kittanning (IUP) and the Electro-Optics Center (EOC). Through the generous efforts of Professor Jim Sherman and Pennsylvania State University's Wendy Gilpin, a member of the PHOTON2 National Visting Board, the IUP alliance, including teachers and faculty from State College High School and Hollidaysburg High School, met on the University's campus.

Participants also toured the EOC, a facility for optics manufacturing technology managed by Penn. State. EOC researchers Mark Shoaf, David Bernot, Ken Freyvogel, and Volker Heydemann talked with the PHOTON2 visitors about their work and about the optics industry in the greater Pittsburgh area.

The attendees, including teacher Paul Longwell and counselor Debbie Lardieri from Hollidaysburg and teacher Wendy McCullough and counselor Scott DeShong from State College High, generated a good discussion with lots of new ideas for classroom activities.

Veeco Instruments representative Joanna Schmidt leads Pima Alliance members on a tour of the company's Tucson facility.

Two weeks later PHOTON2 was just outside Dallas, Texas, meeting with members of the Collin County Community College District (CCCCD) alliance in Frisco. Wayne Jones, Collin County's Associate Dean of Technology, and CCCCD's career counselor Julius Turner welcomed teacher Derek McDowell and counselor Bonnie Jones from nearby Centennial High School. PHOTON2 represents the first time these two schools' technology programs have collaborated on a project; Centennial is a new high school and graduated its first class this past June. Both groups hope that the PHOTON2 alliance will help spur articulation agreements between the schools.

Participants at the Texas workshop visit Cisco Systems.

The attendees made their industry site visit to Cisco Systems' Optical Transport Business Unit (OTBU) in Richardson, Texas, thanks to the interest of Cisco manufacturing director and PHOTON2 National Advisory Board member Dan Tymann. OTBU program director Chris Claytor, new product introduction manager Mark Matos, and several colleagues showed the workshop participants their facility and also gave a presentation on the development of Cisco's new 15600 Multiservice Switching Platform.

Finally, the PHOTON2 first cohort national tour wrapped up in Tucson with the Pima/San Jose alliance workshops. There the team met with Pima Community College faculty members Chien Wei Han and Lazaro Hong, and career counselors Donna Martinez and Victor Salazar. Career counselor Yolanda Fernandez-Carr represented partner school Desert View High School (teacher Jim Treat was ill).

The San Jose City College alliance, based in San Jose, Calif., flew to Arizona for the meeting as well. SJCC's Professor Sydney Sukuta and Lincoln High School teacher Karen Genovese hope to develop a student pipeline of talent to support San Jose's strong optics industry.

Bob Breault, founder of Breault Research Organization, Inc., a member of PHOTON2's National Advisory Committee, and a strong supporter of optics education in Tucson, also attended the workshop.

Participants visited Veeco Instruments, whose Tucson facility manufactures optical profilers and laser interferometers for use in the nanotechnology industry. The group learned a great deal about photonics' applications in this rapidly growing field.

The PHOTON2 instructor team looks forward to another set of introductory workshops in the fall of 2004. Participants in this second cohort will take the web-based, one semester course "Introduction to Photonics" in the spring semester of 2005. ■

Pima Alliance, continued from page 1

While talking with Hanes, Breault became intrigued by the potential benefits that PHOTON2's online distance learning model could have for the region's optics industry. That industry, Breault told us recently, has started to rebound after the challenges posed by the national recession and the telecom crash. Hiring is picking up in general, and business leaders are looking ahead to their future staffing needs—a situation ripe for a workforce development program like PHOTON2.

Hiring in Tucson is picking up, a situation ripe for a workforce development program like PHOTON2.

He contacted Lazaro Hong, head of the physics department at Pima Community College, who in turn encouraged Chien-Wei Han, one of the professors in his department, to sign up for the program.

Han has taught photonics for several years, and the PHOTON2 alliance model meshes well with the college's desire to strengthen ties with local high schools and boost enrollment in Pima's program. It also gives him an opportunity to find out what colleagues around the country are doing in photonics.

"[Since] not that many community colleges in the U.S. are teaching optics," he said, "[PHOTON2] seemed like a good way to network" with like-minded educators.

An HAS200 machine in the Pima semiconductor manufacturing lab. The machine, sponsored by Intel, simulates processes that take place in a semiconductor factory.

Han then contacted Yolanda Fernandez-Carr, a colleague and counselor at the nearby Sunnyside School District. She recognized an opportunity for the district's students and contacted Jim Treat, a 20-year veteran science teacher at Desert View High School.

At Desert View Treat has taught subjects ranging from math to earth science, but his undergraduate degree was in physics. He plans to use the PHOTON2 material in his junior-senior, trigonometry-based physics class.

Treat says the PHOTON2 curriculum fits well with what he already teaches his students. "I spend a lot of time on light in the second semester," he said. "I wanted to learn more about photonics, and maybe pick up some labs I could use in class."

The Pima alliance at work. From left, Yolanda Fernandez-Carr, Donna Martinez, Chien-Wei Han, Victor Salazar, Lazaro Hong, and Karen Genovese (of Lincoln HS, San Jose, CA).

Several of those students have expressed interest in photonics careers, and collaboration with a local college like Pima could offer them many rewards. Pima is only a seven-mile trip down the road, and Treat said that he was looking forward to working with Han and the college through PHOTON2. So far it has been challenging to match schedules. "Dr. Han is only free when I'm not, and I'm only available when he's not," Treat said. Still, he is optimistic that they will find the time to collaborate with one another.

In the meantime, he says, "I have this mysterious heavy box [i.e., the PHOTON2 lab equipment kit] to start playing with."

As for Bob Breault, he is watching the project's progress closely. Asked about his ongoing role in the project, he responded, "Well, I hope to hire [the participants'] students in the future!" ■

National Visiting Board Spotlight — Jason Briggs

Jason Briggs is Education Program Manager for the Optical Society of America (OSA) in Washington, DC. His responsibilities include managing OSA's education outreach programs and services, working with and reporting to the National Science Foundation (NSF), and serving on various advisory committees and NSF education proposal review panels. Briggs is also chair of PHOTON2's National Visiting Board (NVB).

PHOTON2 News *spoke with Briggs recently about his work with OSA and the NVB.*

What is the mission of the Optical Society of America?

Founded in 1916, the Optical Society of America (OSA) was organized to increase and diffuse the knowledge of optics, pure and applied; to promote the common interests of investigators of optical problems, of designers and of users of optical apparatus of all kinds; and to encourage cooperation among them. The purposes of the Society are scientific, technical and educational.

OSA education coordinator and PHOTON2 National Visiting Board chair Jason Briggs

The mission of OSA is to promote the generation, application and archiving of knowledge in optics and photonics and to disseminate this knowledge worldwide.

How do you see your role as the chair of the PHOTON2 NVB?

The National Science Foundation (NSF) views the purpose of the National Visiting Board as one of guidance to both the project leadership team and the NSF helping to resolve concerns and issues and provide periodic reports to the Foundation. As the chair of the NVB it seems that I can best be of service by helping the PIs organize the annual NVB meetings to yield the most practical advice and solutions. The purpose of this role, in my opinion, is to help create an environment of productive assistance among the NVB members for the project leadership team and the PHOTON2 participants.

What aspects of your work at the OSA can help bring a special expertise to the National Visiting Board?

There are three things that come to mind when trying to summarize what I hope to contribute to PHOTON2 and the NVB:

First is OSA's education program experience. The optics education programs and activities in which OSA participates are quite diverse, serving a variety of communities. Managing and developing programs such as our laser technology and career video for educators and students proved quite interesting. The pool of experts contributing content and oversight to the project included secondary and post-secondary level educators, technical specialists from the military, professional development trainers as well as PHOTON Principal Investigator Judy Donnelly. This broad and rich knowledge base helped ensure that the video was technically and scientifically accurate as well as interesting and useful to educators and students. PHOTON2 has also employed this approach to the composition and utilization of its National Visiting Board.

Second is my work as OSA liaison supporting [PHOTON2's predecessor] Project PHOTON in 2001 - 2003. Working with the project leadership team during the formative stages of the original project has allowed me to bring a degree of continuity and institutional memory to the Advisory Board.

Finally, I presently dedicate a great deal of time to organizing a similar collaborative optics education program called "Hands-On Optics" (HOO). This program's collaborating organizations include SPIE (the International Society for Optical Engineering), NOAO (National Optical Astronomy Observatory) and MESA (Math, Engineering, and Science Achievement). The primary goals of this NSF-supported project are as follows:

- Create links from the professional optics community to the informal science education community.
- Reach underrepresented middle school cohorts in science and technology, and connect with their parents and teachers, school districts and communities.
- Provide opportunities for the target populations to succeed in collaborative learning and problem solving through inquiry-based, hands-on applications of optical and engineering skills and knowledge.
- Increase science and technology knowledge for students, and increase awareness of optics as a discipline and career that crosscuts numerous fields.

The goals and communities served differ between HOO and PHOTON2. However, participating in Hands-On Optics has allowed me to share my network of experts and educators with the PHO-

Continued on page 7

Jason Briggs, continued from page 6

TON2 management team and hopefully produce some synergies that might not have otherwise existed—for both projects.

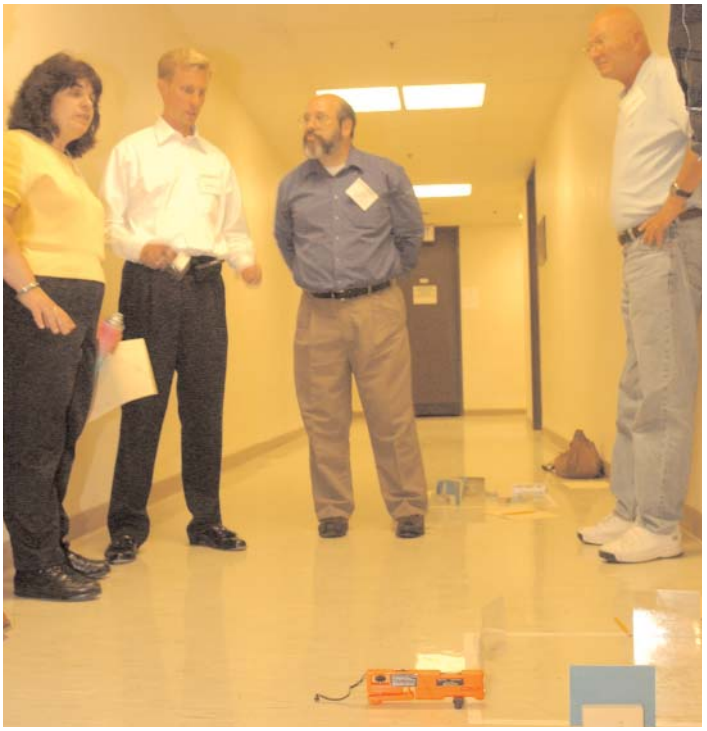
Wearing the hats of a collaborator, liaison and project manager for these programs has helped both organizations and the respective programs because of the mutual sharing of expertise and lessons learned.

How do you think PHOTON2 can best serve the needs of students and employers in the optics/photonics industry?

Two of the most important interrelated challenges that education projects face as they mature are ensuring a lasting impact on the communities they intend to serve while maintaining its relevance to its target audience.

While participating in one of the initial professional development workshops for Project PHOTON in July, 2001 a high school guidance counselor mentioned to me that while the information and materials were exciting, well designed and well received, she wanted to know how she could encourage her students to head down an educational and career path in optics if the job well was running dry?

There is neither a simple answer nor an easy solution for this. It would seem though that the more successful the program is at having teachers, industry representatives and others with vested interests in science, technology, engineering and mathematics education/career pathways involved in long-term advisory roles, the likelihood of maintaining both relevant input and funding streams remain high hopefully serving students and employers. ■



Jason Briggs leads a Hands-On Optics workshop as teachers look on.

PHOTON2 Receives Donations from Companies and Organizations

In the past year PHOTON2 has benefited from the generosity of several companies and organizations who have donated informational materials and other items to the project. These materials have in turn been passed on to the PHOTON2 participants and their students to further help them learn about opportunities in photonics.

Mary deManbey of the Connecticut Business & Industry Association, a member of PHOTON2's National Advisory Committee (NAC), arranged the donation of CBIA's *School-to-Career Pocket Guide* and their excellent *Career Exploration Video Series* CD Rom. *The Guide* is filled with insights into the tricky process of career decisions.

SPIE—The International Society for Optical Engineering, also offered career help. The Society's Sheila Sandiford provided each participant with a copy of SPIE's new *Careers in Optics* CD ROM. The recently released CD takes an in-depth look at the different paths open to those who are trained in photonics science. SPIE also provided copies of their colorful posters for the participants to display in their classroom. SPIE's Science and Technology Strategist Ron Scotti is a member of the PHOTON2 National Advisory Board.

Darrell Hull of CORD, in Waco, Texas, a member of the PHOTON2 National Advisory Board, provided each participant with a copy of their National Photonics Skills Standards, and Anne Chalamidas of Sandia National Laboratories sent copies of their Photonics Recruiting CD. Robert Douglas of the Zygo Corporation in Middlefield, Conn., supplied pens for all of the introductory workshop participants. Douglas is a member of the PHOTON2 National Advisory Committee.

Photonics Spectra, Laser Focus World, Lightwave and *Fiber Optic Product News* generously supplied copies of their publications, which cover many different aspects of the photonics industry.

Finally, Jason Briggs from the Optical Society of America (and this issue's profiled National Visiting Board member) arranged for OSA's donation of 50 1-year subscriptions to the organization's *OPN Magazine*, one of the top journals of the optics/photonics industry. OSA also provided enough screen cleaners and stress toys for everyone in the program—perfect for those late nights of online photonics studying!

Thanks very much to all the groups and individuals who have been so supportive of PHOTON2! ■

PHOTON2 News is a publication of the New England Board of Higher Education (NEBHE), and is funded in part by the Advanced Technology Education (ATE) program of the National Science Foundation (NSF).

For more information, please contact::

NEBHE ■ 45 Temple Place ■ Boston, MA 02111

ph: 617/357-9620 ■ fax: 617/338-1577

www.nebhe.org/photon2.html

Fenna Hanes, Senior Director, Office of Programs

Chuck O'Toole, Administrative Assistant and Newsletter Editor

PHOTON2 NEWS

New England Board of Higher Education (NEBHE)

45 Temple Place

Boston, MA 02111

617/357-9620

Presorted Standard

U.S. Postage Paid

Permit No. 161

Boston, MA