

# Breaking Barriers

By Jim Maxwell

Chemical Physics Professor Peter Palfy-Muhoray's Optics and Photonics class has broken barriers in their classroom this semester. This type of breakthrough isn't what you are accustomed to hearing about when one mentions the Liquid Crystal Institute or Chemical Physics Interdisciplinary Program. In an institute which has many breakthroughs in research and technology it is appropriate that they would find a way to overcome a teaching problem: distance. The question: How do you teach a lecture from 775 miles from Kent State University? The answer: A remote classroom environment made possible by the Internet.



With the help of LCI Research Specialist Jim Francl, Professor Palfy-Muhoray was able to set up a series of remote lectures for his Optics and Photonics class which meets Monday, Wednesday and Friday during the Spring 2005 semester. The remote classroom was held for six classes, from April 4 through April 15.

Palfy-Muhoray wanted to explore the possibility of remote lecturing without special equipment. Generally, videoconferencing requires special equipment, housing and connectivity. So, he wanted to see if it could be done with minimal equipment from anywhere with net access, without requiring any special facilities.

Professor Palfy-Muhoray spent three weeks at the IMA (Institute for Mathematics and its Applications) at the University of Minnesota in Minneapolis in April. The IMA has a special annual program this year: Mathematics of Materials and Macromolecules, and Palfy-Muhoray is one of their long-term visitors. So, he decided to explore his options for videoconferencing without special facilities for his lectures back at Kent. His Optics and Photonics class, consisting of six first-year CPIP students, met in the Liquid Crystal Institute Conference Room in the Liquid Crystal and Materials Sciences Building on the Kent Campus.

"I am interested in exploring the use of new technology in teaching," Palfy-Muhoray said. "I've taught extra lectures before leaving on this trip, and Dr. Bahman Taheri (adjunct CPIP faculty) has taught some lectures to the Optics and Photonics class while I've been away, so it is was not necessary to do this from a curricular point of view. However, it seemed like a really interesting method to explore, and the students were very enthusiastic."

One of the key benefits of remote lectures is that the class can proceed on schedule, as opposed to having to schedule make-up classes when the professor returns.

## How does it work?

It is not widely known that Windows 2000 and Windows XP operating systems come bundled with software called NetMeeting, which allows the sharing of audio, video and other files over the internet. Palfy-Muhoray is making use of this software. In principle, one could simply use NetMeeting and share a Microsoft PowerPoint presentation or a similar document during a lecture. However, students don't seem to respond well to PowerPoint presentations in regular lectures, since the rate at which information is presented is usually too fast, and consequently much of it is not well absorbed.

“The students told me that they prefer blackboard-type presentations. So I am using my tablet PC as the blackboard,” Palfy-Muhoray said.

Basically, Palfy-Muhoray is running two parallel sessions of NetMeeting: One on his regular laptop which handles audio and video. He has a tiny USB camera on the top of his screen that allows the students to see him. He wears earphones with an attached microphone (for high quality audio) positioned at a fixed distance from his mouth. His laptop is connected via NetMeeting with a computer in the classroom, which has good quality speakers and a microphone. The students hear him through the speakers, and can hand the microphone around to ask and respond to questions. A USB camera is also set up in the classroom, so Palfy-Muhoray can see the students; the students can not only see, hear and talk to him, they can also see the image of the classroom that he sees. Palfy-Muhoray also runs NetMeeting on his tablet PC, which is connected to another computer in the classroom, and projected onto a second screen.

“On the tablet, I share a Windows Journal, which just looks like a large pad of paper, on which I write with the stylus. This is the 'blackboard'. So in this way, the students can see and hear me well and I can see and hear them. In front of the students is a full screen blackboard, on which I write by writing on the tablet PC, the way I would write on a piece of paper. The students seem to enjoy this; partly because of its novelty, but I think partly because it works well.” Palfy-Muhoray said.

Palfy-Muhoray continued, “I think the main benefit is that anyone with web connectivity can give an effective lecture from virtually anywhere, without the need for any special equipment or facilities beyond a tablet PC and an inexpensive USB camera. This enables not only traveling faculty to lecture and stay in close personal contact with their students (not just for lecturing and classes, but also for group meetings and individual discussions) but also allows outstanding scientists at distant institutions –anywhere in the world - to give lectures.

When asked his thoughts on how this could be improved in the future, Palfy-Muhoray said, “I think we can streamline the process, optimize hardware configurations, and also learn new teaching techniques using this format. For example, perhaps a combination of blackboard and PowerPoint or other documents, or other web resources, would work well together. I see this format also being excellent for remote collaborations between groups & between individuals. For me, this parallel format, with one regular and one tablet PC, overcomes many of the shortcomings of a single NetMeeting session, and appears to be very effective.

When asked if there was anything he would change, Palfy-Muhoray said, “I have tried using a hands-free Bluetooth earpiece instead of earphones, and wireless connectivity, to be a little more mobile. This seems to work very well. In terms of the presentation, there are many things to try, such as combining different formats. I am also interested in exploring other ways of getting feedback from the students. Perhaps they could have individual earphones/microphones, tablet PCs, etc.”

## **Student Feedback**

“I think it is a really good idea,” CPIP graduate student Enkh-Amgalan (Mike) Dorjgotov said. “But it is not quite as good as the real thing, because there is usually more interaction in the classroom. Though, I think it would be a great way to have guest lecturers from other institutions.”

A second CPIP graduate student, Badel Mbanga said, “I like that we were able to keep on schedule instead of having to make-up classes.” Mbanga said he wishes that some of the Wednesday LCI Seminars were done this way so that he can get a chance to see speakers who don’t have a chance to visit Kent State University. However, Dorjgotov disagrees. He said he likes having the seminar speaker present.

Both students agreed that the remote class was very similar to the normal class, but it actually has the potential to be even more powerful because of the use of various software programs which can display a variety of information including typed text, color graphics, video, etc.

One of the weaknesses that the students pointed out was the currently used microphone equipment. They said that it might be better if each student had a headset so that each individual person could speak

immediately. One of the differences between the remote classroom and the normal classroom is that they felt it was probably harder for Professor Palfy-Muhoray to interpret what they did and did not understand.

Several students mentioned that they would be interested in trying to hold a class where the students stayed in their offices, rather than gathering into a classroom every time.

Both the students and Palfy-Muhoray are very pleased with the outcome of this experiment on 'remote lectures from anywhere', and look forward to exploring ways for further improvements in the future!