

# The University of the Future

High-speed broadband lets NC State University reinvent education.

By Joan Engebretson ■ *Broadband Communities*

Imagine a classroom where students can chat with professors and peer into electron microscopes from a hundred miles away. Imagine a lab where academic scientists work with colleagues in industry as if they were together in the same room. North Carolina State University's Centennial Campus is making these dreams a reality, using its ultra-high-speed connection to the North Carolina Research and Education Network.

Mladen Vouk, NCSU's associate vice provost for IT, says distance education has been growing by 25 percent per year at NCSU despite the lack of adequate tools. Typically, a "heroic" instructor spearheaded a one-off solution based on videoconferencing, says Vouk. However, these capabilities often fell into disuse when their inventors left the university. The university IT department hoped to institutionalize these advances so they would not be lost.

In the "classroom of the future" that the IT department is piloting, remote users, after being verified by the system, can participate in live discussions with instructors and also watch recorded lectures. "One-button" control will allow teachers to focus on course content, not on equipment.

NCSU technologists felt that students in distance learning programs weren't getting the full benefit of the university's high-tech equipment, Vouk says. For example, the biomanufacturing training and education center allowed campus-based students to get hands-on training in the use of state-of-the-art equipment, but remote students did not have the same opportunity.

In a new pilot project, off-campus students interface with this equipment

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using their computer keyboards. The project aims to determine how much of a campus-based student's training can be replicated over a broadband connection. A similar pilot gives off-campus users the ability to interface with an electronic microscope.

## YOUR PLACE OR OURS?

The fourth NCSU cloud computing pilot aims to address a common problem for universities whose employees collaborate with commercial enterprises. Legal requirements often force these researchers to travel to their commercial partners' premises for collaborative work. Now an NCSU solution may enable university employees to remain on campus.

The solution is an on-campus "trusted room." Authorized personnel enter the room using an access control credential, and the room automatically adjusts to support the rules of engagement for the commercial entities with which university personnel are working.

"There would be an intellectual property envelope, so companies wouldn't be uncomfortable sharing proprietary data and information," explains Vouk.

Feedback received to date on the four pilots suggests that they are all

"very doable," Vouk says. The challenge is not making the technology work; instead, Vouk says, the challenge is "making it work in a way that everybody is comfortable with it."

## FIBER MAKES IT POSSIBLE

According to Vouk, although the classroom of the future requires a relatively low-speed connection (in the range of 1 Mbps) at the distant user's end, a high-speed connection is needed at the university to support multiple simultaneous connections. A trusted room might need a relatively small or large amount of bandwidth, depending on the information being exchanged, he says.

The applications that involve remote control of an electron microscope or biomanufacturing equipment should have fairly high-speed connections at both ends to support real-time connectivity, Vouk says, noting that a remote student could have good results using a 100 Mbps connection at a local community center.

If these pilot projects are adopted, Vouk hopes that "every square foot we have used for teaching and learning could multiply a thousandfold in terms of the ability to interact with partners and students." ♦

## About the Author

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