Information Technology

Three governors who champion the use of technology in education practiced what they preach last week. They used audio and video signals delivered by satellite and telephone lines to talk with more than 200 distance-learning professionals meeting near Washington. Technology makes available to rural parts of Iowa and other states "the best educational opportunities in the world," said Iowa Gov. Terry Branstad, a Republican.

Iowa has invested $10 million to create a statewide fiber-optic network. Rural schools can receive advanced courses from other schools or colleges over the network.

Frank Keating, the new Governor of Oklahoma, said his state was using technology so that students in farm communities can receive the same education as those in cities.

"Admissions officers don’t care if they come from a town of a hundred or a town of one million," said Mr. Keating, a Republican.

Vermont’s Gov. Howard Dean, a Democrat in another rural state, said he was advocating more state spending on technology because it provides opportunity and can ultimately save money.

"Without it we will surely fail in our mission to control costs in education," he said.

The National Science Foundation has given the Los Alamos National Laboratory $1.5 million to expand an electronic collection of scientific abstracts.

Originally developed in 1991 as a repository for research on high-energy physics, the system now contains abstracts of papers on physics, mathematics, and economics.

The three-year NSF grant is intended to expand the database to cover all areas of physics and other fields in which users express interest.

The money will also help Los Alamos improve the system by providing direct links to citations, images, data, and a system that allows for feedback from readers.

The archive is available on the Internet to users who have Mosaic, Netscape, or another World Wide Web program. The Uniform Resource Locator is http://xxx.lanl.gov.

A new survey indicates that tomorrow’s college students are not likely to have much experience in using information technology in the classroom when they arrive on campuses.

The survey, by the American Electronics Association’s National Information Infrastructure Task Force, found that just 39 per cent of teachers surveyed said they had access to multimedia computers, 29 per cent had networked computers, and 29 per cent had an Internet connection.

Eighty-five per cent of school librarians had multimedia computers and half had Internet accounts.

JACK M. WILSON makes an unscheduled stop as he crosses the campus of Rensselaer Polytechnic Institute. He wants to demonstrate the wrong way to use computers in the classroom.

He ducks into the rear of a half-empty lecture hall, where an unsuspecting professor stands next to a computer at the front of the room. Images flash on the screen above the instructor while reclining students glance upward, some scribbling notes.

This, Mr. Wilson says, is "the horseshoe-carriage model." Rensselaer, like many other universities, has added new technology to old teaching methods without thinking about how things could be done differently.

The next step is what Mr. Wilson wants to show off. Pairs of students working in front of computer screens, engaged in what they are doing, participating in a class of about 10 that enables them to discuss ideas with the whole group or with instructors roaming around the room.

Introductory physics is now taught this way here, as are some calculus, biology, and engineering classes. Introductory chemistry is expected to adopt these methods in the fall of 1996.

HIGH RATING FROM STUDENTS

Students say the new "studio" classes are higher-approved ratings than they gave traditional courses in the past. Professors say the new methods have caused them to think more about their teaching. They are delighted to hear students ask questions that are more thoughtful than any asked in lectures.

If student and faculty satisfaction were not reason enough to support widespread use of the studio methods, officials here offer another. The smaller, computer-assisted classes cost the institute less than traditional courses that feature large lectures, discussion groups, and laboratory sessions.

Across higher education, all of these attributes have helped to attract the attention of administrators and faculty members who are hungry to find ways to improve instruction and use technology more productively, without drastically increasing costs.

More than 60 visitors have been here in the last two years to see the studio classes firsthand. The College of St. Catherine and Dickinson College have similar programs, California Polytechnic State University at San Luis Obispo is testing the idea, and the

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Rensselaer Uses ‘Studio’ Classrooms to Revamp Introductory Courses

Part of the appeal of the studio method is obvious: Reducing class size to 50 or 60 from 355 greatly increases the opportunity for interaction between instructors and students. But a bigger benefit, Mr. Wilson contends, is the hands-on approach, which requires students to work out solutions on their own without blindly copying down what the professor says.

Time is spent so efficiently, he says, that students need only four hours a week to cover introductory physics versus the five and half that were traditionally spent in lectures, discussion groups, and laboratories.

FEWER TEACHING ASSISTANTS

The reduction in class size produces a saving that Rensselaer officials estimate at $50,000 or more for a large introductory class. Most of it comes from the reduced demand for teaching assistants, who have been primarily responsible for the discussion groups and laboratories in the traditional introductory courses. The saving on personnel expenses, Mr. Wilson says, more than offsets the $100,000 cost of creating a studio classroom, if the costs are spread over five years.

The cost issue, though, is an uncomfortable one here. Mr. Wilson cites it to win over skeptics who believe that smaller classes have to be more expensive than large lectures. But he grows skittish about discussing finances in great detail and shares his analyses only on the grounds that they will not be published.

He says he guards the cost estimates because he doesn’t want the salaries of faculty members and teaching assistants to be made public. But administrators here also worry that the studio experiment will be viewed as a budget-shrinking exercise rather than an attempt to improve instruction.

In recent days, for example, one faculty critic has linked the studio effort with a larger cost-cutting campaign at the institution. "There are a lot of agendas that are not being officially associated with this that are associated with this," says Jane Koret, a professor of biophysics who is the president of Rensselaer’s chapter of the American Association of University Professors.

Mr. Wilson denies such a charge and says that the money saved is only icing on the cake for an effort dedicated to improving instruction. "If we can identify a cost cutting we’re glad to have it, especially if that means we can do some of the things that we want to do," he says. The money saved in converting one physics class to the studio model has been used to plan changes in others, he notes.

A COURSE AT DICKINSON

Rensselaer’s studio arrangement is similar to a "workshop" physics course that Priscilla W. Laws has taught at Dickinson College since 1987. Hers is a smaller effort, which has involved revamping physics classes of only 75 students. Her class uses software developed for Apple Macintosh computers that allows students to conduct experiments by attaching temperature sensors, motion detectors, and other devices to the computers.

In 1993 Rensselaer tried out the studio model in a calculus class that used the "circuit" software for exercises and problem solving. Mr. Wilson and Wayne G. Roberge taught the first physics class in the studio format last spring, using "circuit" software for lab experiments that Mr. Wilson had developed with Edward F. Redish when they had taught at the University of Maryland at College Park.

Rensselaer’s physics department rapidly expanded the experiment to accommodate all 400 students in the introductory class last fall. This spring the department has 700 students in the studio format and 400 in the traditional lecture.

The failure to provide the studio class to all students disapproves Mr. Wilson. "Space crunch, though, is a benefit to Sister Marie A. Cooper, a director at Rutgers University who is studying the effectiveness of the studio method. For the first time, she has the opportunity to see the studio class on the same side as the traditional one.

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who are familiar with the studio courses strongly endorse them. "In the new mode, no one goes through the motions—not the faculty, not the students," says Gary Judd, dean of the faculty. "They take on very different roles."

Joseph G. Eckert, a professor of mathematics, has taught studio calculus, says: "In the studio setting, there's so much more going on in their heads. Instead of four hours of lecture and watching, there's four hours of thinking and doing."

Mr. Roberge, an associate professor of physics, says he appreciates knowing what students are and aren't learning before the first examination. "I can't wait until the next week of the semester. Every day you do something that forces the students to think, and you get to see how they're doing."

Getting Students Involved

Alan Cutler, a professor of chemistry, teaches introductory chemistry to 90 students, most of whom are non-science majors and several of whom are returning students while other faculty members say, "I think the studio approach is going to transform all of those courses that everybody suffered through."

work on integrating laboratory assignments. The computerized lab assignments should be available by fall, enabling students to attend five hours of studio classes rather than four hours of lectures and three hours of laboratory, as they do now. Rensselaer plans to have the entire introductory class—720 strong—a studio setting when new computer rooms are completed in 1996. "Writing the world's best set of notes on a blackboard is not an education," says Mr. Cutler, who is developing the studio class with Tom Apple, an associate professor of chemistry. "It's hard to get the students involved."

Mr. Eckert, the mathematics professor, acknowledges that not every professor will be as pleased with the studio format as those who have been involved thus far. Helping students work through problems on their computers requires more patience and interpersonal skills than does doing it from the front of the room, he says. "I can think of faculty across the campus who are very formal," he says. "They've been Herr Professor/Dr./Sir for too long. They may not function very well in a studio setting."

Others, such as Mr. Roberge, note that the constant pressure on faculty members to produce research could discourage some from investing in time revamping courses. "I was afraid this was going to turn into a huge time sink," he admits.

His experience, though, has left him with no regrets. "I'm thoroughly convinced this is the way to go."