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Online Master's Program for Teachers Shows Promise

Students in program displayed gains in understanding science standards

BY DEBRA VIADERO

The idea of earning a master's degree entirely online both intrigued Chris Willems and made him slightly nervous. But the master's program in science education offered by Lesley University was promising something the teacher wanted: guidance on how to put national standards for teaching science into action.

So Mr. Willems, who at the time taught science at Watertown Middle School in Watertown, Mass., decided to give it a try. What he found surprised him. His two years of online study proved to be a deeper, more interactive, and more satisfying learning experience than he had originally imagined.

Judging from studies done on the program so far, Mr. Willems' experience was not unique. When researchers tested one of the courses in the program head to head against a similar course taught "live" at the university's main campus in Cambridge, Mass., the online class had the edge.

The results showed that the students working via computer had spent more time on their coursework, acquired a better understanding of science, and felt more competent to teach the kind of inquiry-oriented science the course emphasizes than did their counterparts studying on campus.

"For professional development," said Mr. Willems, who last month became one of the program's first graduates, "this is just the type of thing teachers need."

Growing numbers of universities and colleges are offering online master's programs for working teachers. Only a handful, though, offer such programs in science education. Fewer still have taken a stab at scientifically documenting their effectiveness.

Like Mr. Willems, Lesley University officials and the private



Sally Crissman of TERC, center, looks on as Ruth Freeman, right, and Juanita Waldrip meet at a graduation party at Lesley University. The two teachers were e-mail classmates.

research firm with which they worked had something different in mind in 1997 when they set out to design a completely electronic master's program in science education for elementary and middle school teachers. Rather than just "translate" an on-campus course for the computer, the developers wanted to create a program specifically for online use.

An added challenge was to craft the lessons in a way that would support the "inquiry-based learning" called for in the voluntary national science standards. The aim of that approach is to help students think like scientists by providing well-designed, hands-on experiences with science, rather than relying on traditional lectures and teacher demonstrations to get the concepts across.

"If we believe this is what we should be doing with students, then this is what we should be doing more of with teachers," said Susan J. Doubler, a project director at TERC, the Cambridge, Mass.-based research nonprofit that partnered with the university in developing and evaluating the program.

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Kits and Comments

With grants from two federal agencies and a foundation, Lesley and TERC in 2000 introduced "Try Science," the first of 11 courses in the master's-degree program. Teachers who enrolled in the three-credit, introductory-level class received science kits in the mail with all the equipment to do classroom assignments at home.

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Chris Willems

Science Teacher

The assignments were posted on Fridays. Students typically spent their weekends tinkering with the experiments. From Tuesday to Thursday, they posted their results online, sharing them with a group of five to seven online classmates, and getting feedback and guidance from the university instructor.

"How did you get that answer?" some of the commentators would ask, as the graduate students sought to figure out the scientific concepts at work in each activity.

To find out how the electronic course stacked up against an on-campus class, the researchers compared it with a nearly identical class taught "live" by the same professor. The researchers studied the online postings and sent observers to the regular classroom to record the discussions there. They looked at the lesson plans that students wrote, the time diaries they kept, and results from pre- and post-tests they took.

Wynne Harlen, the main author of the resulting report, said the richness of the data helped make up for the small number of participants studied—15 students in the online class and 13 in the on-campus class.

"We would've liked to have more," said

Ms. Harlen, who is a researcher at the University of Bristol in England, "but what we did was a very intense and thorough look at the actual process of learning."

The results showed that:

- The online students spent two hours more a week on coursework than their on-campus counterparts did.
- Students' understanding of the basic science concepts involved in their experiments improved more among the online group.
- Students taking the electronic class were significantly more confident of their ability to teach science after the course than the on-campus students were.

In other respects, the classes were more evenly matched. The groups differed little, for example, in their understandings of the meaning of scientific inquiry. Students in both classes showed some mixed success in drawing up lesson plans that reflected inquiry-oriented teaching approaches. They could easily devise hands-on activities, but had more trouble involving students in investigating answers to their own scientific questions.

Past 'Good Enough'

One reason the results seemed to be better for the online class, researchers and university officials say, may be that the students had more time to reflect on and write about their learning.

"With a face-to-face course, you're usually there from 7 p.m. to 10 p.m.," said Ms. Doubler of TERC. "You leave, and then you stop thinking about it. With the online course, you're thinking about it all week long."

The nature of electronic communication also contributed to learning, according to teachers in the program.

"Sometimes, when adults have to do these things in cooperative groups in the classroom, you might be inclined to say, 'Well, that's good enough,' when you really know it's not," said Mr. Willems. In contrast, when he worked at home, he said, "I would plug away until I found something that was satisfying to me."

Another of the program's newly minted graduates, Jennifer L. Craddock, said the computer eliminates some of the interpersonal distractions that can impede learning.

"If you're focused on what somebody is saying, as opposed to the expression on their face, or what they look like, or what they're doing, there's a lot more clarity in communication," said the Newton, Mass., teacher. Students felt freer to offer constructive criticism, to ask "dumb" questions, and to relate their learning to their personal work experiences.

"I know more about these students than I have ever known about any group of students that I've been teaching face to face," said Linda M. Grisham, an associate education professor at Lesley University and the director of the master's program. Ms. Grisham, who is also a co-principal investigator for the project, taught some of the online courses.

Some of the program's first graduates said they were surprised, in fact, to find themselves tongue-tied last month when they met for the first time with their classmates.

The developers are still evaluating the program to document its effect on students' learning and teaching practices. Ms. Craddock, however, said she can detect the differences in herself.

"It not only changed the way I teach," she said, "it changed the way I think about learning."

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