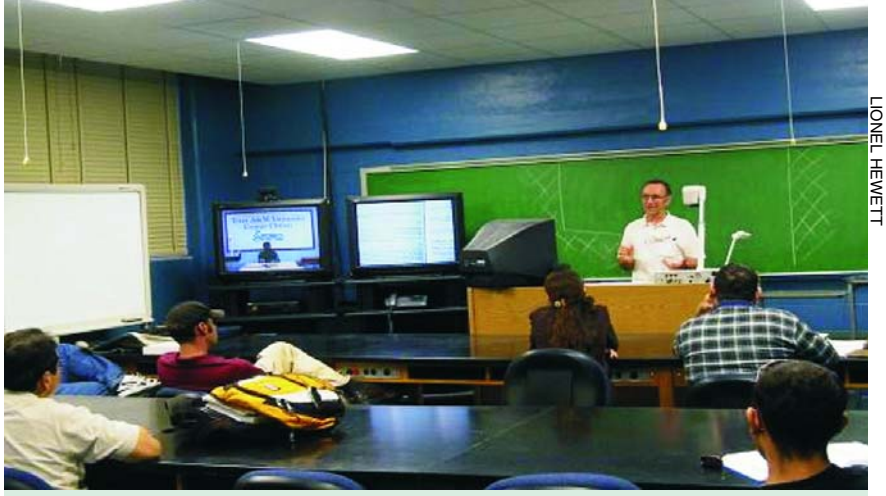
Collaborations like the TECP differ from what is perhaps the best-known distributed physics department, at the City University of New York. There, graduate students from many branch schools travel to a central location in Manhattan for their classes. With its hybrid of interactive television and the internet, the TECP model also differs from typical distance-learning classes. The coalition launched a laboratory course last year and hopes to eventually offer a master's degree. Says Suson, "I truly believe that distributed departments represent one of the best ways, if not the only way, that small programs will survive in the future."



LIONEL HEWETT

**Teleteaching:** Students in Lionel Hewett's modern physics class see course material on the right-hand screen and a remote participating classroom on the left.

## Video barriers

Each TECP department has a room equipped with cameras and two monitors. One monitor shows the professor or his lecture—"simulations, video tapes, projected notes, PowerPoint slides, anything that can be projected or put on a computer," says Suson. The other shows the students in whichever classroom someone last spoke.

Generally, each campus has an on-site mentor, a faculty member who collects homework solutions, administers exams, and is available to help students.

The format and technology of remote classrooms slow things down. Not only are equipment glitches common, says Hewett, but "the content has to go on the Web. Putting out content over a little bitty TV screen, they couldn't see the full equations." Distance teaching takes more preparation than a normal class, he adds. "It provides students with anonymity, and they turn off," agrees Corpus Christi TECP professor M. K. Balasubramanya. "When I teach I call on each campus to respond, and that slows the pace."

"You can never truly replace face-to-face between faculty members and students," says James Espinosa, who spent three years on the faculty of West Texas A&M before moving to the University of West Georgia. "To develop a relationship, I had to go out of my way to interact with students. It forced me to become a more personable professor." For example, says Espinosa, "you have to get [the students] relaxed. They were nervous about hitting their microphone or asking questions. There's a barrier with the video system, and you as a professor have to cross the barrier." Adds Suson, "If you get someone who does not realize the difference in medium, and is not prepared, it can be a fiasco."

Oren Quist of South Dakota State University says his remote-teaching collaboration is "more and more convinced it's not as good as having a local teacher. A lot of little things detract from the educational experience." And, he says, "I think if we didn't have it, we'd have more physics majors. It's a smoke-and-mirrors method to get around the rules."

## Strength in numbers

Whatever its drawbacks, the distributed department "has strengths versus being a tiny department," Espinosa says. "The West Texas A&M physics department was on its deathbed when I arrived [in 2000]." The number of graduating seniors "went from zero to two or three a year [in three years]. Without the coalition, I wouldn't have been able to do that." What's more, he says, "the students have more competition and more interactions, and they see the teaching styles of different professors." Remote learning, adds Balasubramanya, "requires more student engagement. They have to be more self-driven."

And if it weren't for the coalition, TECP professors would be stuck either teaching only service courses or teaching the upper-level courses without pay. "Historically, each of us had to teach a course gratis," says Hewett. Professors did that, he says, because "it's the students that stimulate you and keep you excited about the field."

For their part, students see remote classes as a compromise. "When I first started off," says Trent Brunson, who graduated from West Texas A&M this year, "it was an absolute nightmare. My professor had the personality of a tree stump—it was really hard to connect with the professors at first." Brunson, who was the only physics major in his class, says things got better when he started studying with students at another TECP campus.

The regular course offerings afforded by the TECP "allow students to take classes and graduate, instead of switching majors," says Karl Matlage, a recent Kingsville graduate who is starting a PhD in theoretical physical chemistry at the University of Texas at Austin. "The professors were willing to do whatever was necessary to make this work," he adds. "If it was up to me, I'd prefer an on-site class. But for anyone that doesn't have the resources to go to a large university, this is the best bet." **Toni Feder**

# Math and Science Partnership Program Struggling at NSF

**Congressional supporters are fighting to maintain funding for NSF's portion of the Math and Science Partnership while the administration pushes to shift the money to the Department of Education.**

When President Bush's fiscal-year 2005 budget proposal arrived on Capitol Hill in early 2004, US Representative Vernon Ehlers, a Michigan Republican, wasn't happy. Ehlers, a physicist who for years has been one of Capitol Hill's champions of science education, looked at the proposed funding for NSF's share of the fledgling Math and Science Partnership program and saw an unexpected shift in administration policy.

Instead of proposing $200 million for the MSP program at NSF, as it had in each of the preceding two years, the administration wanted to cut funding to $80 million while dra-

matically boosting funding for the Department of Education's version of the MSP program from $12.5 million to $269 million. The proposal to shrink NSF's role in a program that was intended to take advantage of the strengths of both NSF and Education to improve K–12 math and science education troubled many members of Congress. Ehlers and others wrote letters to colleagues asking that the NSF money be restored. When Congress adjourned last year, the NSF program had a $79 million appropriation, and the Education Department was given $180 million.

When the FY 2006 preliminary budget plan was put forward early this year, the administration didn't propose killing NSF's MSP program, but allocated only enough funding to keep it on life support. NSF's MSP funding would be cut by $19 million to $60 million, just enough to cover the continuing costs of the research grants NSF has already awarded. Yet the Education Department would receive $269 million under the Bush proposal, the same amount that was proposed last year.

"I'm afraid I can't give you a good answer," Ehlers said when asked why the administration wanted to reduce the MSP program at NSF. Several congressional observers familiar with the program said the shift in funding toward Education seems to reflect the administration's comfort with traditional education programs and its distrust of innovative ideas that come from the NSF research grants.

Ehlers said he wouldn't "speculate in print" about the reasons for the funding shift, but said it was important to make clear that "it's not an effort to move the program out of NSF and into the Department of Education. It's an effort to move the money from NSF to the Department of Education. These are actually two different programs operating under two different legislative mandates. Both are important."

But in an April speech to an engineering R&D symposium in Washington, presidential science adviser John Marburger defended the administration's attempts to cut NSF funding for MSP as "a widely misunderstood action." He said, "Contrary to popular belief, this program is not being reduced overall. The budget recommends increasing it by $71 million, or 28%, but not in NSF. The increases are in the same type of program within the Department of Education. If you look only at the NSF budget, you will erroneously assume this important program is slated for a reduction. The roles of the two agencies are different, and they cooperate in developing and then promulgating educational best practices."

NSF spokesman Bill Noxon said the administration "wanted to put MSP money into classroom practices versus what we are doing. It's a way to put more money into the classroom under No Child Left Behind."

## Complementary effort

The MSP program began in 2002 as a two-agency complementary effort under the administration's far-reaching No Child Left Behind Act. In both programs, school districts form partnerships with universities and private industry to develop programs to improve K–12 math and science education. Although the broad description of the NSF and Education Department MSP programs is similar, there is a distinct difference.

NSF distributes its MSP money through peer-reviewed grants as a "research and development effort for building capacity and integrating the work of higher education—especially its disciplinary faculty in mathematics, the sciences and engineering—with that of K–12 to strengthen and reform science and mathematics education," according to an NSF background document. NSF awarded 80 MSP grants involving 450 school districts and 150 universities across the nation in the first three years of the program. No new grants were distributed in 2005 and, based on what the House and Senate appropriators have allocated for FY 2006, there won't be any new grants next year.

The Department of Education distributes money to all 50 states, the District of Columbia, and Puerto Rico. The size of each award is based on student population and poverty rates. The states then use competitive grants to schools to "improve teacher knowledge in mathematics and science," according to the department's MSP background document.

## Tragic loss

Many in Congress agree with Ehlers that the MSP programs at NSF and Education are distinct and that both need to be sustained. The administration's efforts to diminish NSF's portion of the MSP money brought strong bipartisan objections on Capitol Hill soon after the Bush FY 2006 budget was presented. In addition to Ehlers, Rep. Rush Holt (D-NJ), Rep. Sherwood Boehlert (R-NY), Senator Jay Rockefeller (D-WV), Sen. Richard Durbin (D-IL), and Sen. Norm Coleman (R-MN) circulated "Dear

Colleague" letters in an attempt to shore up support for the NSF program. In April, Coleman and Rockefeller sent a letter to members of the Senate Committee on Appropriations asking that the partnership at NSF be funded at "not less than 200 million dollars." With the reduced FY 2006 funding proposed by the president, the letter said, "no new partnerships will be started" either this year or next, and "We believe that this would be a tragic loss."

In a statement to PHYSICS TODAY, Rockefeller said, "Studies tell us that we have a serious problem on our hands—our young people are not keeping up with math and science students in other countries." While the Education Department's MSP program is "helping states meet upcoming achievement standards mandated under No Child Left Behind," the NSF program is needed "to understand the underlying reasons for the performance gap." In a statement, Coleman said, "Effective early math and science education is essential for our future, and this program enables [NSF] to fulfill its mission to advance the teaching of science and mathematics in our schools."

Gerry Wheeler, executive director of the National Science Teachers Association, labeled the shift of MSP money away from NSF "unfortunate." The administration, he said, "feels more comfortable with money going into the Department of Education and there is more of an instant payoff. Research is slower and costs money."

The NSTA is a participant in a five-year NSF MSP grant that is exploring ways to use the internet to electronically mentor teachers of physics and other sciences in remote areas, Wheeler said. "How do you best reach teachers with help? How do you get content to science teachers? It is an e-mentoring program that is in its third year, and we have some good results that can be used by the Department of Education."

While Coleman and others are pushing the $200 million funding level for the NSF MSP program, several congressional staff members said the realistic goal, given the overall tight budget, is simply to keep the program alive. Earlier in the summer, the House approved Bush's request of $60 million for the NSF MSP program. Senate appropriators proposed $64 million, saying in their committee report that "current activities initiated by MSP [at NSF] are only beginning to provide measurable results and have yet to be ready for implementation on a nationwide basis." The report says the additional $4 million would "fund activities that are not being addressed by the companion program at the Department of Education."

In determining the NSF MSP budget, Ehlers said, "The attitude of the House appropriators was, 'Look, we're so short of money we can't start anything new, but we'll continue the existing program there.'" The Senate's $64 million "will maintain all of the existing programs and possibly allow for a few new starts."

But the $64 million is not a sure thing. House and Senate appropriators have yet to agree on a final budget and there is no guarantee the extra $4 million will stay. Ehlers said he is hoping not only to keep the $4 million, but also to increase it. "I'm the eternal optimist on the theory that if you are not an optimist, you're doomed to fail."

**Jim Dawson**

## Bomb Scientists Remember Trinity

Eleven men who helped design, build, and detonate the first nuclear bomb gathered in Washington, DC, in July, 60 years after the Trinity Test, to reflect on the Manhattan Project and its legacy.


NAS

The near-capacity symposium was organized by former SLAC director Wolfgang Panofsky and sponsored by the National Academy of Sciences' Committee on International Security and Arms Control. Today's decision-makers have not seen an atomic bomb explode, and to many of them, nuclear weapons have become primarily symbols of strength and prestige and tools for diplomatic bargaining, Panofsky warned. In addition to Panofsky, the bomb builders in attendance were Harold Agnew, Hugh Bradner, Robert Christy, Val Fitch, Donald Hornig, Lawrence Johnston, Arnold Kramish, Louis Rosen, Maurice Shapiro, and Rubby Sherr.

The participants' views on the Manhattan Project's legacy varied widely. Christy said, "The 'have–have not' situation doesn't work" because smaller countries believe they can negotiate with the US only if they have the bomb. Sherr suggested that every country should have just one bomb. Rosen said the concern should be about countries, such as Pakistan, in which civilians do not have control over their nuclear weapons. Johnston, the only person to have witnessed the Trinity, Hiroshima, and Nagasaki explosions, said his solution to weapons proliferation is to pray.

**A rapt audience** (top) listened to veterans of the Manhattan Project, including Wolfgang Panofsky (lower left). NNSA head Linton Brooks (center) and Rep. Rush Holt also spoke at the gathering.

Also speaking at the symposium were Representative Rush Holt (D-NJ) and National Nuclear Security Administration chief Linton F. Brooks. Holt, a physicist, said, "I can think of only a dozen [representatives] who follow these issues," and said the excessively limited discussion on nuclear and science policy in Congress is "dangerous for the country." Further details on the symposium, including a full list of speakers, can be found at http://www.physicstoday.org. **Paul Guinnessy**

## Europe to Set Particle Physics Strategy

The CERN council is taking the lead in creating a European strategy for particle physics after completion of the Large Hadron Collider (LHC). This month the council will assign the task to a working group that will draft a strategy for the council's approval next summer.

The working group will consist of the heads of Europe's main particle physics labs, scientists representing each of CERN's 20 member countries, and five scientists each from the European Committee for Future Accelerators and CERN's science policy committee. The ECFA and SPC scientists will do the legwork, with the full working group convening next spring to finalize a strategy proposal for the CERN council.