ence tests are a step in the right direction, say reformers, with their open-ended problems that require students to explain their reasoning and give credit for correct reasoning as well as correct answers. In addition, the New Standards, a student assessment system that includes open-ended test questions and student portfolios, is gaining popularity.

If Clinton has his way, by 1999 every eighth grader in the country may have the chance to take a standards-based test. Such a test could help shepherd teachers toward a more consistent interpretation of the standards, note former NCTM President John Dossey and current President Gail Burrill, who are chair and vice chair of the committee charged with writing the mathematics exam to be given to eighth graders nationwide.

But some reformers wonder how much impact a voluntary test can have. It is not yet clear what rewards and punishments Clinton's proposed test would carry, but it may be a test without teeth. "I'm skeptical about it," says NCISE's Raizen. "Does it count? No. There are a lot of people who think this kind of test is going to drive reform, but I don't think so."

There's also the question of coverage. So far, only six states and 15 urban school districts have volunteered to join the testing program (see map). Still, the White House remains committed to preparing such a test through the Department of Education, and officials claim that a dozen more states are ready to join in.

Standard iterations

Even as educators around the country are struggling to implement the 1989 standards, NCTM leaders are working on a new and improved version for 2000. The revision provides a "chance to see where we are and what we've done," says Mary Lindquist, education professor at Columbus State University in Georgia, who heads the math council's Commission on the Future of the Standards. The main message will stay the same, but the revised document will "clarify" several areas—including basic skills and proofs—that critics fault in the current version. The new document, called *Standards 2000*, will also update recommendations for using calculators and computers in the classroom. The NCTM has received critiques and suggestions in sessions at its national and regional meetings and through its Web site (www.nctm.org), and it's sorting through thousands of responses before proposing revisions.

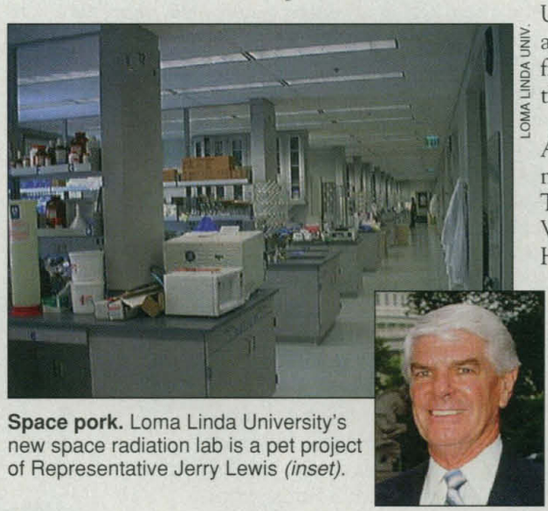
But Glass says she doesn't need a national survey to glimpse the future of standards-based reform. "The teachers who have taught by the standards and who have invested in them believe in them," she says. As a result, she adds, her students "become problem solvers. And I don't think that leaves a child."

–Gretchen Vogel

1998 BUDGET

Bipartisan Mood in Congress Opens Door for Pork

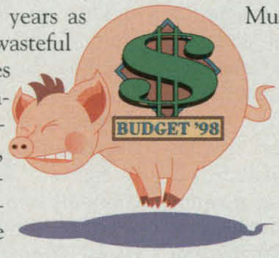
The bipartisan flavor that has become so popular in Congress these days has brought with it the distinct aroma of pork. After falling into temporary disfavor with congressional budget cutters, legislative earmarks—also known as porkbarrel projects—no longer seem to be a lightning rod for criticism. That's good news for the institutions that stand to gain millions of dollars in R&D funding set aside by lawmakers in 1998 spending bills that Congress hopes to wrap up as it returns to work next week. But others worry that Congress is encouraging bad science by circumventing peer review.



LOMA LINDA UNIV.

Space pork. Loma Linda University's new space radiation lab is a pet project of Representative Jerry Lewis *(inset)*.

Adding money not requested by the Administration and targeted for specific districts or states is an ancient practice. However, it came under attack in recent years as part of a broader assault on wasteful government spending. But times have changed. The antigovernment ardor has cooled, key opponents of pork have retired, and Republicans and Democrats have set aside their differences in a plan to eliminate the budget deficit by 2002.



NASA and the Environmental Protection Agency (EPA) appear to be the biggest recipients of proposed earmarks among R&D agencies. About $20 million of the $614 million that the House appropriated for EPA research in 1998 is for specific pork projects, for example. A typical earmark is the one offered by Representative Jerry Lewis (R–CA), who chairs the House panel with funding oversight of NASA and EPA. He's designated $2 million in NASA funding for a space radiation lab at Loma Linda University, a Seventh-Day Adventist school east of Los Angeles, which is in his district. Lewis has also arranged for the University of Redlands in California—also in his district—to get $1 million from a $6 million pot for EPA to study the rapidly disappearing Salton Sea.

In the same bill, Representative Alan Mollohan (D–WV) won $1.9 million for the National Technology Transfer Center in Wheeling, West Virginia, while $2 million is headed to Houston's Mickey Leland National Urban Air Toxics Research Center, compliments of Texas legislators. Next door, the Louisiana delegation, which includes Appropriations Committee Chair Bob Livingston (R), wangled $2 million for research at the University of New Orleans into urban waste management and $1.3 million for oil spill remediation research at McNeese State University in Lake Charles, Louisiana.

The Senate version of the bill has fewer earmarks, but they are individually more impressive. Senator Ted Stevens (R–AK), who chairs the Senate Appropriations Committee, succeeded in winning the largest NASA earmark of all—$2.5 million for a science learning center in the small town of Kenai, Alaska. And again, Democrats shared the spoils. Senator Daniel Inouye (D–HI), for example, inserted $2 million for work on a national space education curriculum by the Center for Space Education at the Bishop Museum in Honolulu.

At this point, the projects appear to be mostly add-ons rather than substitutes for the agency's scheduled research. The House version of EPA's overall budget is $104 million above this year's level and $41 million above the president's request, while at NASA, the House has included a little less than $10 million in specific earmarks to a $5.7 billion appropriation that is $50 million higher than the White House requested for science, aeronautics, and technology. The bills that include funding for the Energy and Defense departments also have a smattering of specific R&D earmarks, such as the Senate's offer of $3.9 million in DOE money for biological imaging at the University of California, Los Angeles.

Some appropriators have resisted the

trend. Congress has decreased the number of research-related earmarks in the bill funding the Department of Agriculture, in particular those for new buildings and facilities. In the past, such earmarks have totaled about $60 million in the agriculture bill. And the bills funding the National Science Foundation (NSF) and the National Institutes of Health, with their strong traditions of peer review, remain generally free of pork.

But those agencies are the exceptions, say congressional and Administration officials, who note that there is less pressure now to avoid earmarks. "Members are trying to build a more bipartisan relationship to get the [appropriations] bills through," says one Administration official. Earmarks, added as a favor to key members of Congress, "get the legislation through more smoothly." And the class of 1994—part of the new Republican majority—no longer has the power it once did to make an appropriations chair think twice before adding pork to a bill.

Antipork forces lost an ally when former Science Committee Chair Bob Walker (R–PA) retired. He and former chair George Brown (D–CA) battled many R&D earmarks during the past several years. "You have to go to the floor and fight them," says Walker, now with the Wexler Group in Washington. He says the practice "makes for bad science" because it gives an advantage to research that "passes no test but a parochial and a political one." He acknowledges that earmarks can benefit small universities that are not part of the "old-boys' network" of larger research institutions, but he says doling out pork is not the best way to overcome biases in the funding system.

Beneficiaries of congressional largess see it differently. Money for the Leland Center goes for peer-reviewed grants to researchers largely outside Texas, says Ray Campion, the physical chemist who is the center's president. He argues that EPA refuses to request money for the center because it is independent "and they don't control our research agenda." As a result, the center must turn to Congress.

Specific earmarks don't tell the whole story. Many legislators now target specific research areas rather than individual institutions, with the expectation that the program will benefit particular institutes and universities. Senator Kit Bond (R–MO), for example, added $40 million for a plant genome initiative at NSF, knowing that such an effort could well involve such important constituents as farmers, the Monsanto Co., and Washington University in St. Louis.

So while the practice of earmarking may change form, it is unlikely to go away. "It's like Whack-a-Mole," one staffer says, referring to the carnival game. "You hit in one place, and it comes up in another."

–Andrew Lawler

KOREA

In Land of Industrial Giants, Universities Nurture Start-Ups

SEOUL, KOREA—Sunyoung Kim, a molecular biologist at Seoul National University (SNU) in Korea, never thought of himself as an entrepreneur. His impressive academic pedigree—a Ph.D. from Oxford University, followed by a postdoctoral stint at the Massachusetts Institute of Technology's Whitehead Institute and an assistant professorship at Harvard Medical School in Boston—marked him as a dyed-in-the-wool researcher. But after developing a new gene-therapy technique, the 41-year-old associate professor at SNU's Institute for Molecular Biology and Genetics found himself not only the founder of a company to commercialize the technology but also a role model for Korean entrepreneurs. In March, his relatively modest deal with a British pharmaceutical firm won him front-page newspaper and television coverage, admiring letters from high schoolers, and envious phone calls from friends. "Everyone was thinking I had become a billionaire," Kim says.

D. NORMILE

New breed. SNU's Sunyoung Kim, with Seung Shin Yu, standing, and Seon-Hee Kim, seated, in a corner of the institute that serves as his company's lab.

His first billion is still a long way off, but the attention is real. Korean planners and economists believe that the nation's reliance on a few large conglomerates, the so-called chaebol that include such familiar names as Samsung, Hyundai, and Daewoo, has reached a dead end. The chaebol are staggering under mountains of debt and poor management, and the country's former ferocious economic growth has slowed to a crawl. "The only hope for the Korean economy is in venture businesses," says Jang Woo Lee, a professor of management at Kyungpook National University in Taegu, who says academia is an ideal place to spawn them.

Because venture business success stories are rare—Lee puts the number at 20 or so—university and government officials are taking several steps to boost that number. This spring faculty at the country's national universities earned the right to take a 3-year leave to start a new business. Those who fail may return to the classroom. More significantly, universities are expanding or setting up venture business incubators, which typically provide would-be entrepreneurs with free or low-cost space and access to university computers, test and measurement equipment, and machine shops. Supported by government and university funds and some private contributions, they offer management seminars, faculty advice, and some sort of networking scheme to connect entrepreneurs and potential "angels." The model adopts many features of successful incubators in the United States and elsewhere.

The Korea Advanced Institute of Science and Technology (KAIST) pioneered this approach in 1992, and this month it expects the government to sign off on a new facility that will allow it to quadruple the number of businesses under its wing. "We have far more applications than we have space for," says Ho Gi Kim, director of the center, which now nurtures 23 companies.

But KAIST is hardly alone. In June, SNU's College of Engineering inaugurated its University New Technology Network, which will open university facilities and provide other support to budding entrepreneurs. "At the beginning of this year we recognized the importance of venture [activities] for the college of engineering," says Jang Moo Lee, dean of the college. Pohang University of Science and Technology (POSTECH) plans to join the crowd in November by opening a venture business center, and it has already expanded the incubator concept by creating POSTECH Venture Capital Corp., a $30 million fund to invest in selected venture businesses. "No one else is combining an incubator with funding," says Jeon-Young Lee, who doubles as POSTECH's dean of research and as president of the new venture capital firm.

The goal of these incubators is to produce successors to Korea's most famous start-up group, the Seoul-based Medison Co., which was founded in 1985 by a group of KAIST graduate students. Medison, which employs 300 people and had sales last year of $92 million, holds a third of the world market for