U.S. SCHOOL REFORM

Packard Heir Signs Up for National 'Math Wars'

Computer heir David W. Packard keeps a low profile, but there are signs that his charitable institute may add math to its substantial investment in reading reform

A California-based group of academics, including four Nobel Prize winners in physics and nearly 200 mathematicians, sent a tremor rippling through the national education reform movement last fall with a full-page advertisement in *The Washington Post*. The 18 November ad urged the Department of Education to withdraw its "premature" endorsement of 10 new mathematics texts for elementary and secondary school students and caused enough of a fuss to spawn a congressional hearing last week (see sidebar). It was the latest salvo in the "math wars" that have raged for years in California and elsewhere between advocates of different approaches to math teaching (*Science*, 29 August 1997, p. 1192). But for some educators, the most intriguing aspect was neither the message nor the list of signatures. What caught their eye was the man who paid for it: computer heir David W. Packard.

Packard, a tall, slender 58-year-old former professor of ancient Greek and the oldest of four children of David and Lucille Packard, is a newcomer to the math wars. But he brings an impressive arsenal. In the past few years he has funneled nearly $30 million into California schools to support a phonics approach to reading, including a virtual makeover of one low-performing Sacramento elementary school. The money has come largely from a $15 billion foundation created by his legendary father, the co-founder of Hewlett-Packard, who died in 1996. In July, the rapidly growing parent foundation, which supports a range of activities including family planning, conservation, and marine research, gave the Packard Humanities Institute (PHI), of which David W. Packard is president, some $1.5 billion to pursue its own philanthropic agenda. And some math reformers are wondering if the suddenly flush institute—which by law must spend at least 5% of its endowment each year—intends to make an even bigger splash in their pool.

Packard, whose foundation in the past has preserved old movie houses and promoted the use of technology in the humanities, declined to talk to *Science* about why he agreed to spend $70,000 for the ad. But he's clearly interested in the subject. "I see no need to cooperate in distracting your readers from the central issue of math instruction," he wrote in a brusque faxed reply to a request for an interview. (After checking with Packard, PHI trustee Robert Glaser, former dean of the Stanford Medical School and a family friend, also declined to talk to *Science*.) Instead, Packard points to a statement issued shortly after the ad appeared, which says that the institute hopes "to encourage broad discussion and debate on this important topic."

Sitting pretty. Pacific Elementary Principal Kathy Kingsbury, center, meets after school with her teachers inside the new conference center *(inset)* financed by Packard

CREDIT: R. ALLEN

The ad takes aim at curricula that follow guidelines from the National Council of Teachers of Mathematics, the National Academy of Sciences (NAS), and the American Association for the Advancement of Science (AAAS, publisher of *Science*), which last year rated some of the texts very highly. Proponents praise their multifaceted and conceptual approach to learning mathematics and use of daily-life applications, while critics say they stray from fundamental arithmetic concepts such as fractions and offer insufficiently rigorous instruction.

The ad Packard paid for criticizes parts of some textbooks, as well as accusing the Department of Education of ignoring the views of working mathematicians in assembling its panel. Its supporters also believe that the department should leave selection of texts and curricula to state and local school boards, despite the fact that the federal agency was ordered by Congress to conduct such an exercise. "We were getting lots of letters from people who didn't like the books the panel had chosen but felt powerless to object," says David Klein, a math professor at California State University, Northridge, and a leader of the group, Mathematically Correct, that had already posted the letter on its Web site. "We were looking for other ways to express our views."

That opportunity came via Williamson (Bill) Evers, a research fellow at Stanford University's Hoover Institute and another leader of Mathematically Correct. "I know David and meet with him regularly, and he has been looking for ways to support elementary school mathematics," says Evers. "I mentioned the open letter, suggested that a newspaper ad might be appropriate, and put him in touch with [Klein]."

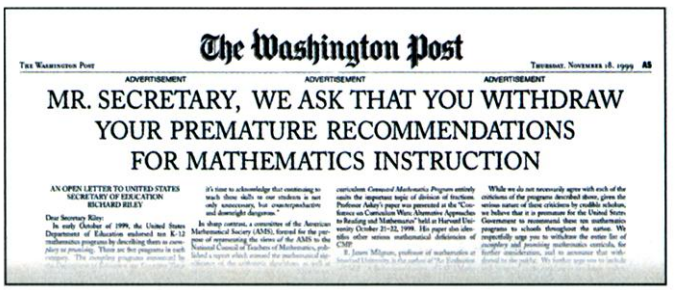
Some math educators say the ad, instead of encouraging open debate, inflames an already politicized conflict. "I respect many of these people, but I think what they have done is very harmful," says Hyman Bass, president of the Mathematical Sciences Education Board at NAS and a professor at the University of Michigan, Ann Arbor. Bass and others say the criticism will make it harder for the math and education communities to work together.

The institute's statement draws a direct link between the math and reading wars, noting that "the debates over mathematics instruction obviously reflect many of the same highly emotional ideological issues familiar to us from the parallel debates about reading." In reading, the battle pits phonics, an approach that stresses the need to decode sounds and letters, against advocates of whole language instruction, which empha-

Effort to Pick Best Math Texts Denounced at Congressional Hearing

The math wars came to Capitol Hill last week. But the pedagogical question of how to improve elementary and secondary school math instruction took a back seat to the ideological debate over who should call the shots in publicly funded education.

The 1 February hearing was held ostensibly to give Congress a chance to review the Department of Education's (ED's) recent selection of 10 exemplary math curricula, the first in a planned series by expert panels that will also cover science, technology, and other areas. A November ad in *The Washington Post*, signed by more than 200 mathematicians and other academics, attacked the exercise and demanded that the department repudiate the recommendations (see main text). Although the hearing gave Administration officials a chance to defend the process, it served mainly as a forum for critics of the federal government's role in education.



The Washington Post

ADVERTISEMENT ADVERTISEMENT ADVERTISEMENT

MR. SECRETARY, WE ASK THAT YOU WITHDRAW YOUR PREMATURE RECOMMENDATIONS FOR MATHEMATICS INSTRUCTION

AN OPEN LETTER TO UNITED STATES SECRETARY OF EDUCATION RICHARD RILEY

Headline news. This *Washington Post* ad, funded by David Packard, focused attention on the federal panel's report.

The 14-member expert panel rated each curriculum on its quality, ease of use, suitability for a diverse population, and compatibility with national standards. Such measures, tested in two pilot studies, were intended to replace "anecdotal evidence" of success, noted expert panel co-chair James Rutherford of the American Association for the Advancement of Science (which publishes *Science*). Out of 61 voluntary submissions, five were scored exemplary and another five considered promising. In keeping with its mission to spread the word about high-quality programs, the panel did not rate the other programs nor release their names.

But the critics were not convinced. "There is no valid research that shows any of these curricula are effective," claimed Stanford University mathematician R. James Milgram. "With one possible exception, the programs represent a single point of view, with the teacher as a facilitator. There are no means for students to develop mastery of basic arithmetic operations. Algebra is also shortchanged." Milgram said that "the sad state of mathematics education is primarily the responsibility of two agencies, the National Science Foundation [NSF] and the Department of Education," and Representative Michael Castle (R–DE), who chaired the hearing, said afterward that the government should do more research before it puts its "stamp of approval" on these programs.

Neither Judith Sunley of NSF, which funded development of six of the 10 programs, nor Kent McGuire, head of ED's Office of Educational Research and Improvement, took issue with Milgram's critique at the hearing itself. Sunley said later that "there are many factors that affect the success or failure of a particular curriculum." Part of the problem, noted Rutherford, is that "it's almost always possible to find information to support or criticize any program."

Much of the hearing focused not on content but on politics, however. "At the very least, the federal government should first do no harm," asserted Susan Sarhady, a Plano, Texas, parent who has led an unsuccessful fight against one of the recommended programs, Connected Math, adopted 3 years ago by local school officials in Plano. Another parent, Mark Schwartz of Livonia, Michigan, incensed by his local district's use of another exemplary program, Core Plus, labeled U.S. public education "the largest monopoly in the world." And Rachel Tronstein, a former student in that district, complained that she and her classmates were forced to follow 4 years of a curriculum "that simply does not work."

Democratic members defended the exercise and reminded their colleagues that it was mandated by a 1994 law. "It's critical that districts have access to solid research on what works," said Representative Dale Kildee (D–MI) about the exercise, "and the Department of Education panel should be one of many tools." But Representative William Goodling (R–PA), chair of the Education and the Workforce Committee, which convened the hearing, joined several of his Republican colleagues in denouncing the exercise. "I'm afraid that these federal expert panels sometimes take away from the power and good sense of local officials," Goodling said.

Representative Vern Ehlers (R–MI) pleaded with his colleagues to stop "talking about angels dancing on the head of a pin" and to start "looking at the larger issues" of what factors affect student learning. But exorcising politics from the discussion may be impossible. Tronstein, who is now a freshman at the University of Michigan, Ann Arbor, acknowledged that her concern for mathematics education wasn't the only reason she came to Washington. Glancing around the hearing room, her eyes wide with awe and ambition, she confessed: "I'd love to be back here someday, as a member."

–J.D.M.

sizes the importance of the meaning and context of words. Phonics, the prevailing approach to reading in the 1950s and '60s, has made a comeback after being supplanted by whole language in the '70s and '80s. Although most reading experts say that both elements are essential, each side has hardened its position by becoming affiliated with a broader political philosophy—conservative vs. liberal. PHI's statement on the math letter sharply critiques whole language instruction: "superficially plausible but demonstrably ineffective methods of teaching reading [have] caused great harm to children."

Education reformers are now taking a closer look at Packard's involvement in the reading wars for a sense of the tactics he may bring to the math campaign. They are discovering that, unlike many philanthropists, he is hands on and very demanding. That style is evident in his bankrolling of Pacific Elementary School, a poor Hmong-majority school whose reading scores are the lowest in the 53,000-student Sacramento school district. "David doesn't just give money away," says Pacific's principal, Kathy Kingsbury, who arrived last summer. "He wants to do good—and he wants to see results."

Packard is spending $4 million this academic year to renovate the old school, build a new conference center next door, and hire reading coaches for each grade. It's a compromise: District officials vetoed his original plan to create a new school and instead convinced him that Pacific was an ideal test-bed for his ideas. In addition to attracting Kingsbury—a former teacher and reading coach who had been principal at another school—and paying for another administrator, Packard's largess also led to a significant turnover of the 30-member professional staff. One-third of the teachers decided to go elsewhere after learning that they would be required to stay an hour later (with pay) each day and to adhere closely to a phonics reading curriculum called Open Court reading. As a result, Kingsbury has taken on the added burden of

training nine rookie teachers.

Math instruction at Pacific, like at every Sacramento elementary school, is based on material from Saxon Publishers Inc. of Oklahoma. It emphasizes repetition and strict adherence to the text as the best way to develop computational skills. If Packard decides to support elementary school math reform, observers speculate, he's likely to back a similar approach.

But Saxon's curriculum is controversial: A recent AAAS ranking of middle school math texts omitted Saxon because "its philosophy, organization, and format ... were not well suited to a benchmarks-based evaluation." Saxon's president, Frank Wang, acknowledges that "we don't emphasize higher order thinking and open-ended problem solving." Wang says the company, which also offers homeschooling materials aimed at a Christian audience, deliberately avoided the controversial Department of Education review "because we knew we'd get low ratings [based] on the criteria they were using."

If his reading track record is any guide, Packard is also likely to immerse himself in math reform. "He does everything himself, and he is in total control," says Betty Flanary, coordinator for Packard's Reading Lions program, which is pumping $15 million a year into 27 California school districts that use Open Court. "David walks around with binders on every school. He analyzes the data, and he's not afraid to call school officials and ask what's going on in a particular classroom that isn't performing."

"A micromanager? I guess you could say that," laughs Marion Joseph, a California State Board of Education member and leader of the phonics movement who is widely credited with introducing Packard to the reading debate. "But David is classically trained in literature and music, and [Open Court] appealed to his understanding of how we learn language and its structure." Adds Jim Sweeney, Sacramento city schools superintendent, "He pushes very hard for full implementation of what he is supporting. But before he gets involved, he researches it thoroughly."

Packard has not said how long he will support Pacific, although Sweeney, Kingsbury, and others have warned him that lasting gains don't happen overnight. But whatever he decides to do next, those who have worked with him say he'll want to see results. "I can tell you that David Packard has made one heck of a difference in our schools," says Sweeney. That ability to get his way is exactly what worries Bass and other math educators on the opposite side of the reform movement. **–JEFFREY MERVIS**

AIDS RESEARCH

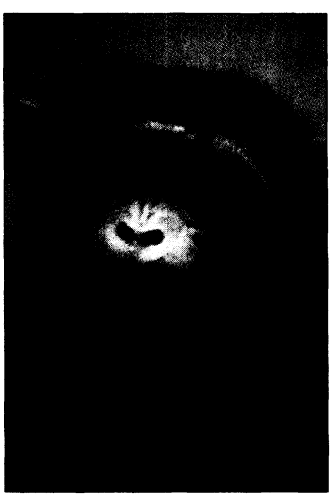
Vaccine Studies Stymied By Shortage of Animals

NIH doesn't know how many Indian rhesus macaques its researchers need, nor how many are available. And that's a big problem

Paul Johnson's lab at the New England Regional Primate Research Center is one of the best equipped in the world to study the immunology of SIV, the simian AIDS virus. Johnson also enjoys generous funding from the National Institutes of Health (NIH). So why does he have to wait 2 to 6 months to start an experiment? The answer is simple: The demand for rhesus macaques, the animal of choice for Johnson and a growing number of AIDS researchers, far outstrips the supply. But the reasons for that shortage are complex, encompassing everything from international trade to internal NIH politics. And AIDS researchers are worried that, if the shortage persists, it could hinder progress in the field. "It's a huge problem," says Norman Letvin, a leading AIDS vaccine researcher based at Harvard's Beth Israel Deaconess Medical Center in Boston. "And it's going to get much worse."

For many years, AIDS researchers bemoaned the lack of a good animal model for testing vaccines, measuring the toxicity of various drugs, and exploring the disease's progression. But the Indian rhesus macaque was found to develop a disease that closely mimics human AIDS when infected by SIV and has steadily gained in popularity. NIH has stimulated the demand for these monkeys by doubling its budget in the past 5 years for AIDS vaccine research. To make matters worse, researchers in reproductive biology, malaria, and other fields also have begun to rely more heavily on rhesus macaques.

But supplies are limited. India, once the main source, has banned exports of the species since 1978, and NIH is phasing out a domestic program to breed "clean" macaques that was begun after many imported monkeys were found to harbor pathogens. The resulting imbalance between supply and demand has caused delays of up to a year or more for animals with certain genetic features and has driven up the price of the animals to a level that is straining many researchers' budgets.



Breeding discontent. The supply of rhesus macaques can't keep up with demand.

Six months ago NIH's Office of AIDS Research (OAR) sponsored a meeting at which researchers concluded that there was a "severe shortage" of rhesus macaques and urged NIH to act quickly. But NIH officials say it's not clear what should be done, or which component of the $18 billion agency should take the lead. "There is a problem, but I'm not able at present to identify its dimensions," says OAR director Neal Nathanson. The issue, he says, falls in the lap of another NIH branch, the National Center for Research Resources (NCRR), which in addition to funding the New England facility and seven other primate facilities specifically bankrolls breeding programs with both nonprofit and commercial suppliers. "I've conveyed my sense of the [problem] to NCRR," Nathanson says.

Some outside researchers wonder, however, if NCRR has the ability or desire to improve the situation. "It's a very isolated institute, and it doesn't collaborate well with other institutes," says Alan Schultz, a former head of AIDS vaccine research at the National Institute of Allergy and Infectious Diseases who now works with the International AIDS Vaccine Initiative. Jerry Robinson, who oversees the regional primate centers for NCRR, agrees that there is a "real crisis." But Robinson has had difficulty assessing the number of primates available for research, and no one at NCRR has tallied the number of animals required by NIH-funded researchers.

Several factors complicate any attempt to make even a simple assessment of the available population, says Robinson. Primate centers and private colonies reserve some animals for breeding or behavioral research, and disqualify others that are too young or old. In addition, both commercial breeders and primate centers have been known to play favorites. "The people involved

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