



## EDUCATION

## An Invisible Hand Behind Plan To Realign U.S. Science Education

Meet the master bureaucrat behind President Obama's controversial proposal to reshuffle the federal government's \$3-billion-a-year investment in STEM education

An art exhibit in downtown Washington, D.C. features the pictures and words of 89 Washington movers and shakers. The exhibit at the National Portrait Gallery, entitled *The Network*, includes high-profile politicians such as Nancy Pelosi, Eric Cantor, and Karl Rove and renowned scientists turned policymakers such as Nobelists Harold Varmus and Steven Chu. A few, like journalist Cokie Roberts, have earned fame for explaining the ways of Washington to the public. And then there's Kathryn Stack.

Stack is deputy associate director for education and human resources at the White House Office of Management and Budget (OMB). The agency exercises vast sway over government spending and regulatory practices yet prefers to operate in the shadows. So Stack's position qualifies her for the Hall of Fame of faceless government bureaucrats. But she's learned a thing or two about wielding power during a 35-year career spanning six administrations.

"Several others [in the exhibit] told me that she knows how to get things done," says Chicago artist Lincoln Schatz, explaining why he chose Stack for the exhibit, which opened in December. "They said few people understand the complexities of large bureaucracies like OMB as well as she does."

Despite her professional mask of anonymity—OMB officials declined to make Stack available for an interview—2013 may be a breakthrough year for Stack. In addition to seeing her picture hang on the walls of the National Portrait Gallery, Stack watched President Barack Obama unveil a budget initiative this spring in which she played an important role: a proposal to radically realign the federal government's \$3 billion annual investment in STEM (science, technology, engineering, and mathematics) education.

The 226 programs, which serve students, teachers, and the public, are spread across 13 agencies. The reorganization would cut

the number in half (see graphic, next page) and severely curtail STEM activities at the National Institutes of Health (NIH) (see sidebar, p. 340), NASA, and several other so-called mission agencies. At the same time, it would strengthen the efforts of the Department of Education, the National Science Foundation (NSF), and the Smithsonian Institution by designating them as lead agencies.

The proposed reshuffling hit the U.S. scientific community like a bombshell. For starters, they hadn't seen it coming and were miffed that they weren't consulted. "We are disturbed with the nontransparent process by which this proposed consolidation was developed," wrote the Association of American Universities and the Association of Public and Land-grant Universities in a 2 July letter to John Holdren, the president's science adviser.

But being shut out isn't the community's chief complaint. Three months after the plan was sent to Congress as part of the president's 2014 budget request, STEM educators are still waiting for the White House to explain how it drew up the list of programs to be ended, merged, or expanded. They also worry that the reshuffling will damage existing activities by shifting resources away from agencies with unique expertise and tools to do STEM education and asking the lead agencies to take on too much (*Science*, 19 April, p. 258).

CREDIT: LINCOLN SCHATZ, THE NETWORK (KATHY STACK), GENERATIVE VIDEO STILL, 2012

Downloaded from [www.sciencemag.org](http://www.sciencemag.org) on July 25, 2013

**The big picture.** OMB's Kathy Stack is a good example of how a career civil servant can help shape policy at the White House.

At the core of the proposal is an approach to governing, called evidence-based policy, which Stack has long championed at OMB. It calls for killing, reforming, or expanding government programs based on the results of regular, rigorous evaluations of their effectiveness. To officials in both the Bush and Obama administrations, the complex, disparate array of federal STEM education programs seemed ideally suited for the approach.

But critics say that Stack and her OMB colleagues, in their eagerness to consolidate, inverted the strategy, making decisions before the evidence was in. The result is a flawed plan, say the spending committees of both the Senate and House of Representatives. "What is proposed as a consolidation of existing STEM programs ... is really the elimination of many proven and successful programs with no evaluation on why they were deemed duplicative or ineffective," the Senate Appropriations Committee wrote last week in a report accompanying its 2014 bill for the Department of Commerce, Department of Justice, NASA, NSF, and several other agencies.

### Looking for evidence

Although evidence-based policy may seem like an obvious way to make the federal government work better, it's not common practice. "Most agencies don't think about outcomes," Stack told the Society for Research on Educational Effectiveness (SREE) in a March 2011 speech. "And most of what they consider to be a rigorous evaluation isn't." At the same time, she noted, "most agencies think that everything they are doing is effective."

In addition to complacency, another major obstacle to implementing evidence-based policy is vested interests, says Robert Gordon, Stack's boss at OMB during the first 4 years of the Obama administration. "People have talked for ages about trying to rationalize and harmonize programs that were overlapping and wasteful," says Gordon, who left OMB in March to become a guest scholar at the Brookings Institution in Washington, D.C. "But it's hard to do because these programs have so many supporters."

Of course, evidence-based policy requires

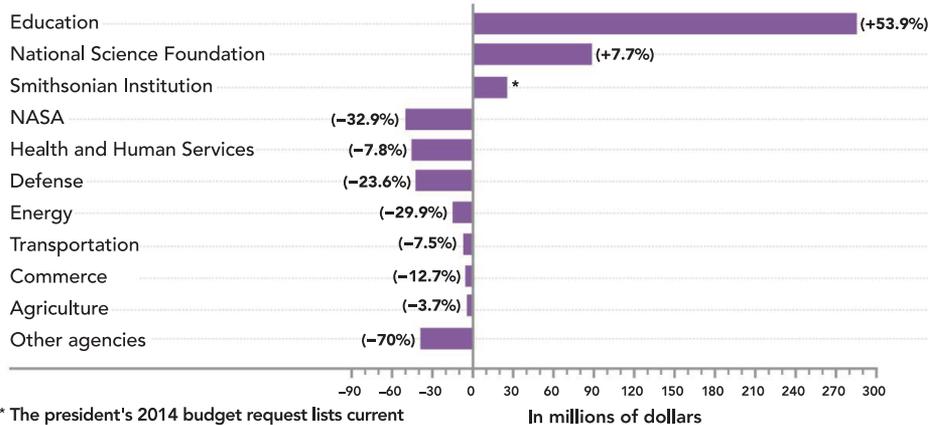
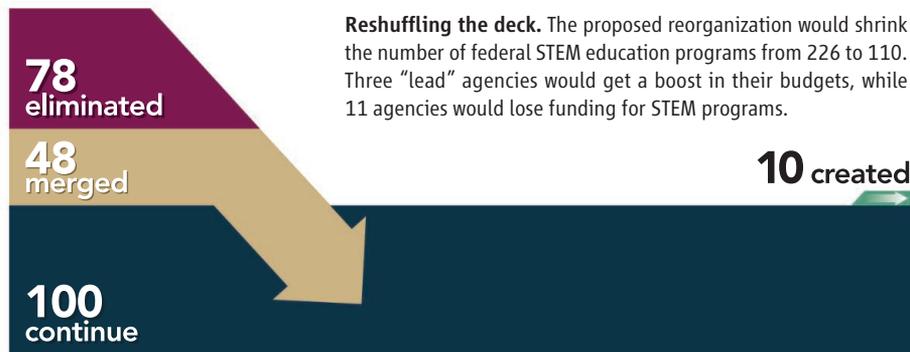
evidence. But the results of previous evaluations of STEM programs were not the driving force in selecting winners and losers, Holdren told the House science committee last month. Instead, he said, the reorganization was intended to "cut back on lower priority or narrow-purpose programs [to] make room for targeted increases in high-priority areas." Better evaluation would be a consequence, not a cause, of the reorganization, he noted. Once the reshuffling was implemented, he told legislators, the administration would be in a better position to carry out "rigorous evaluation and evidence-building strategies."

That's a reasonable approach, says Robert Shea, who was Stack's boss during most of the George W. Bush administration and is now a

drawn near-unanimous opposition from several of the congressional panels with jurisdiction over one or more of the agencies that would be affected. The House science committee, for example, last week approved a bill to reauthorize NASA programs that would prohibit the administration from implementing "any proposed STEM education and outreach-related changes proposed [for NASA] in the president's 2014 budget request." Senate appropriators were equally dismayed, telling NIH officials on 11 July to put the brakes on their plan to dismantle NIH's Office of Science Education and related grants program supporting informal health science education.

Likewise, House appropriators last week approved a bill that would restore money

## Putting the Squeeze on STEM Education Programs



director in the Washington offices of Grant Thornton, a global professional services firm. "You'll never consolidate all programs with similar objectives," Shea says. "But you want to get a sufficiently small number so that they can be better coordinated."

Such arguments haven't appeased opponents of the proposed reorganization. It has

in 2014 for STEM education activities at NASA and the National Oceanic and Atmospheric Administration and put the kibosh on a realignment of undergraduate STEM education programs at NSF. The accompanying report also reflected the concerns of many science educators: "The ideas presented in the budget request lack any substantive

implementation plan and have little support within the STEM education community.”

### On-the-job training

White House officials, including OMB and Stack, aren't publicly saying what they think of such rebukes. Indeed, after spending her entire career inside the federal bureaucracy, Stack knows that civil servants aren't even supposed to make policy. Yet, she has played an outsized role by focusing on how to make the wheels of government turn more smoothly.

“There are policy folks who come in from administration to administration who have great ideas, but they have no idea how government works,” she told Schatz, the artist. “I understand the culture and tools, and I know how to translate into action the big visionary ideas that political officials have.”

Those who have worked with Stack testify to her extraordinary grasp of the levers of power. “Kathy taught me, rather than the other way around,” says Gordon, a political appointee with extensive experience in Democratic policymaking circles. Jon Baron, whose nonprofit Coalition for Evidence-Based Policy conducted an evaluation of STEM education programs during the Bush administration,

says that Stack “has been very successful in persuading her political bosses” that rigorous evaluation should be part of policymaking.

Colleagues say it helps that Stack doesn't have her own agenda. “She's tied for the least ideological person in government that I

“I understand the culture and tools, and I know how to translate into action the big visionary ideas that political officials have.”

—Kathryn Stack

know,” says Robert Granger, retiring president of the William T. Grant Foundation. Granger had frequent interactions with Stack when he chaired the National Board for Education Sciences within the Department of Education during the Bush administration. “Instead, she's a terrific public servant who's motivated by what she thinks will help the government spend its money well to help kids.” Baron struck a similar chord when he told the SREE

audience that “we should be glad that she uses her powers for good, and not evil.”

Stack arrived in Washington in 1978 with an undergraduate degree in government from Cornell University to work on education issues within the former Department of Health, Education, and Welfare. In 1982, she moved to OMB and began promoting the idea of using program evaluation to shape policy in education and income assistance programs.

The tide of evidence-based policy was coming in as Stack toiled away at OMB, and she rode the wave. One result: In 1993, Congress passed the Government Performance and Results Act as part of a Clinton-era campaign to “reinvent government.” And Stack played a leading role in a similar initiative under George W. Bush known as PART (Program Assessment Rating Tool).

Then, in 2007, Congress passed and President Bush signed the America COMPETES Act, which sought to boost innovation by increasing federal support for research and improving STEM education. One of its provisions called on the government to evaluate existing STEM education programs. Stack asked Baron's center to conduct a review

## NIH Teaching Units, Cherished In Schools, May Be Shredded

Two miles north of its Bethesda, Maryland, campus, the National Institutes of Health (NIH) operates a supply warehouse that serves its intramural scientists. The tidy blue and white building stands out along a grimy commercial strip dotted with auto repair shops. And so do its contents: One corner of the warehouse holds what is arguably the finest collection of health science education materials in the world. But the 180 tons of lessons may soon be pulped by a local recycling company rather than used to feed hungry minds.

Since 1994, NIH's Office of Science Education has created lessons covering 19 topics incorporating the latest biomedical discoveries. Designed to appeal to middle and high school students, there's a neurobiology unit that focuses on addiction, for example, and an exploration of biological rhythms that discusses sleep disorders.

Over the years, NIH has distributed more than 450,000 copies of the supplements, free of charge. Although the 2-week units are also available online, the office maintains some 200,000 copies for teachers—probably the vast majority—who might have trouble downloading and copying them at school.

That supply is now in jeopardy, however, as a result of a government-wide restructuring of science education programs (see main story, p. 338). The White House has proposed shutting down NIH's \$4-million-a-year education office next year and ending a \$15-million-a-year grants program that supports informal science education activities outside the regular classroom. Without a budget, the office won't be able to pay its share of the rent

and utilities for the warehouse, and the material could simply be tossed.

The moves could happen as soon as 1 October, the first day of the 2014 fiscal year. NIH officials have refused to allow Bruce Fuchs, an immunologist who has directed the office since 1996, to speak with the media. But outside scientists funded by the grants program and others familiar with the office say that its nine full-time employees have been told they will be reassigned and that contract staff members will be let go.

NIH is keeping its cards close to the vest. “We have not made a final decision about whether the office is closing at the end of fiscal 2013,” says Principal Deputy NIH Director Lawrence Tabak. But he acknowledges that NIH is considering all manner of cost-saving options because of the \$1.5 billion bite taken out of the agency's overall \$30 billion budget by the government-wide cuts known as the sequester. “We have to think about our priorities and see what rises to the top,” he says.

Teachers and health science educators around the country say that closing the office would be a tragedy. For the past decade, Jodie Spitze has taught an NIH unit on bioethics to her biology students at Kent-Meridian High School outside Seattle, Washington. She says that the NIH materials fill a big gap. In addition to providing teachers with the latest research results, the units also prepare them to lead classroom discussions of hot-button issues.

“IB [International Baccalaureate] biology has a requirement to teach controversial issues like stem cell research, but there's no strategy to do it,” says Spitze, who was featured in a 2008 *Science* article on teaching bioethics in school. Teaching kids how to listen and build a convincing argument based on facts rather than opinions “can be even more important sometimes than the content,” she adds. “Otherwise, the kids with the strongest opinions wind up dominating the discussion, which just turns into a debate.”

that found only 10 of the 115 existing STEM programs had been rigorously evaluated. Of those, only four were found to have achieved their goals, which included raising student achievement in science and math, improving the skills of STEM teachers, attracting more students into STEM careers, and increasing public understanding of science.

### Correcting “bad habits”

Stack doesn't claim to be an expert in STEM education. “My education credentials are probably at the bottom,” she told her SREE audience. But when the new Obama administration decided to apply evidence-based policy to STEM education, she dove in. “When Obama came in, we moved into overdrive,” Stack said. “Within weeks of taking office, they wanted a briefing from OMB on what we could do to improve government. I had learned from my STEM experience that there wasn't a lot of good evaluation out there.”

Although neither a scientist nor an educator, Stack was invited to speak to the President's Council of Advisors on Science and Technology (PCAST) in October 2009 as it prepared to launch the first of two studies of ways to improve U.S. science and math education. Stack used the opportunity to explain the rationale behind evidence-based policy.

“We have gotten into some really bad habits,” she told PCAST. “We don't challenge our assumptions that existing programs work. We plan evaluations once the programs have been up and running, when it's hard to create an experimental design with a control group. And evaluation officials are rarely part of the discussion when policymakers examine programs.” Although Stack said many agencies may not be able to conduct such high-quality evaluations, she told PCAST that “STEM is one area that may be ripest for taking this approach.”

Stack and her OMB colleagues decided to offer federal agencies the carrot of additional funding if they teamed up to design STEM education programs that could be evaluated more rigorously. “We said you can have money if you send us proposals to support [certain] research questions and to build capacity” for further evaluation. She said NSF and the Education Department, for example, were “challenged . . . to come up with a plan to improve teacher professional development.”

But money for those and other evaluation experiments dried up after the Republicans took control of the House of Representatives in January 2011 and the president and Congress struck a deal in August to reduce the federal deficit by cutting spending. “As pas-

sionate as I am about rigorous evaluation,” Stack told SREE, “it will be a hard sell to set aside large pots of money for evaluation.” Instead, she suggested agencies look for “natural experiments . . . that might show where they can cut without hurting student performance.”

It is not clear whether the plan crafted by Stack and others at OMB was adjusted before being rolled out by the White House. But its hostile reception suggests that, whatever the plan's technical merits, the Obama administration has done a poor job of selling it politically. The result has been widespread criticism from a research community that has generally applauded this White House's science initiatives.

In a time when every government program is on the chopping block, advocates of STEM education don't expect politicians to exempt their field from scrutiny. But the take-home message from the reorganization controversy, they say, is that politicians should rely on scientists and educators as well as bureaucrats to decide which STEM education programs live and die.

Kathy Stack wouldn't disagree. But her career demonstrates that a faceless bureaucrat can sometimes also be a very powerful voice in setting policy. —JEFFREY MERVIS

Jeanne Chowning, who leads a Seattle-based non-profit organization that uses the NIH materials in teacher training workshops, says: “I don't know anything else out there that is so up-to-date. And you can count on the quality of the resources because they have been developed by top scientists.”

In North Carolina, Suzanne Wilkison runs an organization similar to Chowning's. In April, when she learned that NIH was planning to shut down its science education office, she immediately placed an order for 3000 copies of eight NIH units. “I panicked,” she admits. “I wanted to make sure we had a 5-year supply.”

Joan Thompson, a science consultant for the state's Department of Public Instruction, also placed an order. Next month, North Carolina school officials will pilot an updated course in biomedical technology, now taken by 8000 students each year, which draws upon eight of the



**Principled learning.** Teachers Amy Lindahl and Brandon Staton discover how to use NIH's exploring bioethics curriculum at a summer workshop.

NIH modules. Thompson says that the NIH material is a godsend for school administrators, in part because it is aligned with the next wave of education standards that many states are adopting—the Next Generation Science Standards and the Common Core standards for mathematics and reading.

Congress seems to agree that the office is worth preserving. This month, a Senate spending panel told NIH that it should “continue funding these programs in fiscal year 2014,” adding that “the Committee is not convinced that the quality of these programs

would be maintained if they were moved to other federal agencies.”

NIH's Tabak says that “of course we will consider the sentiments of the Senate.” But he notes that “we are at a very early stage” of a budget process that could extend well into fall. —JDM