At Freedom High School, math chair Deborah Strickler is all too aware of the comparisons being made between American math students and those around the world, but she doesn't think that test scores can accurately measure the aptitude of all students. "There are many excellent math students who experience test freeze when you put a pencil and paper in front of them," she says. "But give them a hands-on assignment and they can always puzzle it out."

Strickler also believes test scores don't reflect talent because American students are forced into a one-size-fits-all mold with lower-level math requirements. "Here, every single child must take algebra, but in Asia only those going to math and science academies take it," she says. "As a result, we can't cover as much as quickly because the curriculum is watered down. We're not supposed to track students, but it seems we've forgotten that students' minds develop differently."

Correspondents from the *Financial Times* back up Strickler's assertions. After observing successful secondary schools around the world, they determined that the best schools were locally controlled and emphasized individualized learning, where teaching is tailored to students' needs. But writer Jon Boone doubts that "world-beating educational systems can be cut and pasted from one country to another." For example, Finland's small and homogenous population could explain why it ranked highest in overall education according to PISA.

And in developing countries, where populations far outpace opportunities, students like Shonai Someshwar and her classmates compete for scarce jobs. "Peer pressure to excel is very high—there are higher demands in India as opportunities are scarce for such a large population," says Lochani Subramanian, who teaches science and math to Bangalore eighth-, ninth-, and tenth-graders. "It is a matter of pride for a parent to say that his child was a science student."

Shonai's parents are an exception. "They have never forced me to study math and science. They have always told me to study what I want to and what I like," she says. And the same is true of Bradley Jamison's parents. She hasn't been pressured to pursue a math degree for job prospects. She likes math and is good at it.

Choosing to follow one's passions is inherently American. Even though countries like India and China are racing to recreate a U.S.-style environment for innovation and ingenuity, America will always have the advantage, says Yong Zhao of Michigan State University. "With a diversity of talents among many different people," he says, "we'll continue to flourish." nea

Send comments on this story to clong@nea.org.

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Louisville union and administration join to get math and science right.

BY ALAIN JEHLEN

For some teachers, the giant, hissing Madagascar cockroaches might be a problem. The high-stakes test on a competing subject is definitely a problem. And school officials who tell teachers what to do instead of listening—they're not helping, either.

Improving math and science education in the real world is tough and messy. That's what they're finding in Louisville, Kentucky. But it's happening anyway.

"It's all about preparing kids to live in this global, diverse, ever-changing society," says middle school math teacher Kat Crawford. She is one of seven teachers playing a possibly unique role in science and math reform: They have been released to work full-time on a massive program to revamp K–8 math and science education, and they're primarily responsible to their union, not the district administration. "We can stand outside of the system and bring the real questions to the table," says Crawford, adding, "It's not all hunky-dory and easy. At times, it's like pulling teeth."

Supported by a $25 million General Electric (GE) Foundation grant, the Jefferson County Teachers Association (JCTA) and the district administration together launched the ambitious project to develop world-class standards—by which they mean the approach used in the best schools of high-scoring countries like Japan and Singapore. Whether the high test scores are due to superior instruction is open to debate, but their teaching strategy, says Crawford, makes sense.

That approach includes less rote memorizing of facts forgotten right after the quiz and more getting students to think through the mysteries of numbers and the natural world. They want to stop rushing to "cover" a large number of topics and focus on teaching fewer topics to mastery. They want less lecturing, more action.

Louisville already has extraordinary educators who teach that way. Tara Hengartner skips making her seventh-grade students

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memorize the properties of chemical elements. Instead, she hands out cards that describe real elements with fake names, and has her students puzzle out the patterns so they come to understand the Periodic Table. Third-grade teacher Sytrina Turner gets her children up out of their seats to act out multiplication so they can feel the math. Jason Hubler, whose funky fifth-grade classroom features a collection of X-Men comic books to lure reluctant readers, teaches area and perimeter by having students calculate how much carpet and trim they'll need to renovate a house.

Louisville wants this kind of teaching used throughout its schools, supported by rewritten standards and excellent materials that teachers don't have to spend their weekends developing. Creating that new system in the midst of competing pressures—big classes, standardized tests that impose their own agendas, and struggling inner city families—is hard. It requires constant reality checks to be sure the plans and materials are practical. And that is why the union's independent role is essential.

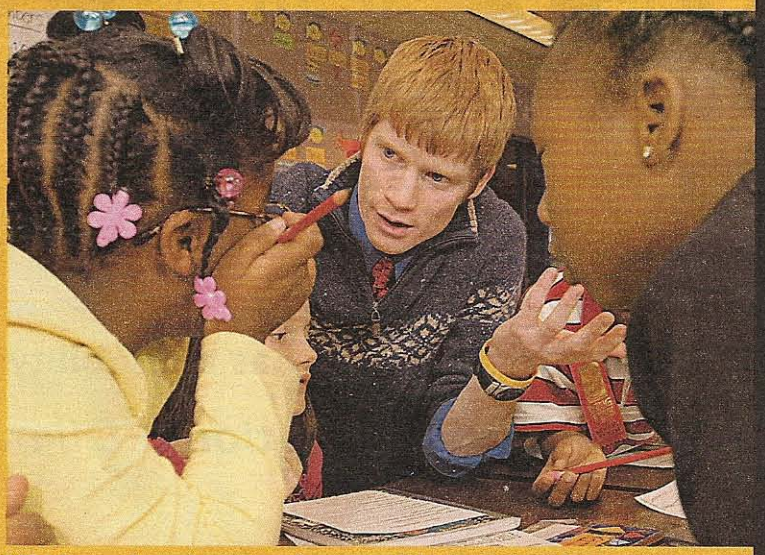
In October, for example, the district held a professional development session on the new science units, and many teachers came away angry. "My time is wasted because I really need help in social studies and math," said one fifth-grade teacher. His reason: Kentucky gives tough, high-stakes tests in social studies and math, not science, in fifth grade. The union's released-time teachers were there to hear the complaints and bring them to the joint task force managing the whole effort.

Teacher input also flows through many other channels, like building rep meetings and surveys. At one informal feedback session, Melissa Ronayne, who teaches science to third-graders at a Montessori magnet school, protests that the new science units bring up topics in an order that's different from the Montessori sequence—rocks first, living creatures later. She's gotten nowhere with the district office, but the union reps promise to go to the project steering committee with the simple idea that everybody doesn't have to use the new units in the same order.

Teachers bring up other problems, like the lack of time provided for feeding and cleaning up after creatures such as crayfish and the Madagascar hissing cockroaches, which are shipped in for biology lessons. "I don't have time to babysit a bunch of crayfish," says Ronayne. Worse than taking care of them, she adds, is having to kill them afterward: "I had to stuff them into a Ziploc bag and stick them in the freezer, and they were all writhing and fighting," she reports. "I didn't feel real good about it."

Fifth-grade teacher Ann Walls says some of the new assessment materials are badly written and useless to teachers. "It's classic 'garbage in, garbage out,'" she says. Louisville suffers from far too many disjointed tests required by different parts of the school administration, says JCTA President Brent McKim. Walls and other teachers have filed a class-action grievance to try to bring the testing regimen under control.

The math and science project got underway last year and is scheduled to go at least until 2009. (GE awarded similar grants to Cincinnati and Stamford, Connecticut, this school year.)



Mike Ice explores the nature of matter with his second-graders. **Sytrina Turner** (opposite) teaches multiplication by putting kids in motion.

In Louisville, elementary and middle schools voted last spring to use the inquiry-based science modules chosen by the administration-union task force. By and large, the new materials are doing a great job of engaging students. Walk into Caryn Walker's third-grade class and you'll hear:

"Look! A claw!"

"This one's a mouse leg!"

And the occasional "Ew!!"

The children are dissecting owl pellets and sound like they'll remember this lesson for a long, long time. (For the uninitiated, owls eat their prey whole and use their gizzards to press inedible parts like bones and feathers into pellets, which they regurgitate.)

Meanwhile, the project's math teachers are working with a commercial publisher to develop new lessons and materials. Recently, the union reps put a hold on the publisher's professional development program because they hadn't had a chance to check it out with teachers in other districts that are using it.

What gave the union that power? The GE Foundation said from the start that the project steering committee must make its decisions by consensus. "Teachers are the ones delivering the message to the children, so we're passionate about getting teachers unions and the central office to do this in collaboration," says Kelli Wells, head of the foundation's education programs.

But in 2009, the GE money is due to run out. Will teacher participation end with it? McKim says the union bargained the consensus decision-making and professional leave for teachers into a formal memorandum of agreement, so if the district wants to keep the innovation going, it will need to do so with its teachers.

It's an unusual arrangement, but JCTA is an unusual union, McKim says. "Generally, unions that get involved with curriculum and instruction are not very militant, and unions that are militant don't get involved with curriculum," he notes. "We're militant, and we use our militancy to push our curriculum agenda."

That's good for teachers and good for students, says McKim, because "success depends on teachers buying in, and that depends on teachers being full partners." nea

PHOTOS: BRIAN BOHANNON