

## EDUCATION WEEK

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# Lectures Are Homework in Schools Following Khan Academy Lead

By **Sarah D. Sparks**

*Lawrenceville, Ga.*

Susan Kramer watched her packed 10th grade biology class weave through rows of desks, pretending to be proteins and picking up plastic-bead “carbohydrates” and goofy “phosphate” hats as they navigated their “cell.” As they went, they explained how the cell’s interior system works.

It’s the kind of activity her students love, but one that would normally take Dr. Kramer several classes’ worth of lectures and procedures to set up, and thus be hard to find time for. The class was able to do it this year because Dr. Kramer, who has a medical degree, and some of her colleagues here at the **Gwinnett School of Mathematics, Science, and Technology** have moved their lectures and lab setups online to save class time for hands-on learning and discussion.

This “flip model” of instruction has gotten national media attention lately, thanks to its promotion by Khan Academy, the high-profile nonprofit online-tutoring library created by Salman A. Khan, a Massachusetts Institute of Technology graduate who was looking for a way to help his young relatives with their homework.

The model—in which teachers introduce lectures online for students to access at home and then use class time for group practice and projects normally relegated to homework—is not unique to Khan Academy, however. Advocates of the approach say it allows students to work through meat-and-potatoes background on their own, giving teachers more time to go in depth through discussions, projects and other activities in class.

Critics, though, argue the model is too reliant on online materials and will prove difficult to use in schools without major technology infrastructure.

“You can’t just say, ‘I’m going to flip the classroom’ without establishing a foundation of the instruction and the technology,” said Jeffrey G. Smith, a doctoral fellow at St. Mary’s College of

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The advertisement features the sas logo at the top left and bottom left, with the tagline "THE POWER TO KNOW." to its right. The central text reads "Educators and Students: FREE online curriculum resources in all the core subjects for middle and high school grades." Below this is a button that says "CLICK TO LEARN MORE". The bottom half of the ad shows a collage of educational materials, including a tablet displaying a globe, a laptop with a butterfly graphic, and various worksheets and charts.

California, in Moraga, who studies the flip model. “You have to create the environment in which students can go online.”

Smith said Khan’s approach shows promise, but the model is still nebulous. “What you see right now,” he said, “is people who are creating this environment and experimenting with the environment.”

Flipping mirrors bits and pieces of several educational practices with a long history, from the peer instruction and **rapid-feedback assessment** systems advocated by Harvard University physics professor Eric Mazur to open-learning online courses like MIT’s **Highlights for High School**.

Yet only recently has technology advanced enough to allow teachers to assign and track individual students using online material at home, and the flip model is still in the earliest stages of being formally studied.

### National Spotlight

Khan Academy, for its part, teamed up last year with the Los Altos, Calif., school district to launch a **pilot** of the model. In it, students in grades 5-8 use Khan-produced online lectures as part of their math curriculum. The pilot has expanded from 150 students in five classrooms last year to 1,000 students in 40 classrooms this year.

“It’s not just about the kids watching the same lecture the night before. For us, the big piece is having teachers use data to make instructional decisions about their students,” said Alyssa Gallagher, the assistant superintendent for curriculum and instruction for the 4,500-student district.

Courtney Cadwell, who teaches 7th grade math at Eagan Junior High School and serves as a math coach to teachers in Los Altos, agreed that the rapid feedback on her students has been the best part of the model. The Khan program allows teachers to track what videos and individual exercises students spend the most time watching and working through, and how long it takes students to correctly solve 10 problems in a row for any given math concept.

Last year, as one of the first teachers in the Los Altos pilot, Ms. Cadwell started all of the students in her remediation class on Addition 1, the most basic Khan unit, and asked them to work through all the units at their own pace while she watched using the program’s data-tracking system.

Students worked through those initial units quickly, but she could see when they hit their “pain points”—sometimes on material covered several grades earlier.

“In order for me to get that kind of understanding of a student, I would have had to sit down one-on-one and work through problems and see a pattern, which I’m happy to do, but it takes a lot



The “flip model” gives 10th graders more time for lab work in Susan Kramer’s biology class at the Gwinnett School of Math, Science, and Technology in Lawrenceville, Ga.  
—David Walter Banks/Luceo for Education Week

### The Los Altos Pilot

Administrators, teachers, and students in Los Altos School District share their experiences with Khan Academy. **Source: The Khan Academy**

of time," Ms. Caldwell said. "This confirmed my suspicions and allowed me to remediate much more quickly."

"I was able to identify those learning gaps in real time, whether it was from 3rd or 4th or 5th grade, and I was able to remediate and saw those learning gaps begin to disappear," Ms. Caldwell said.

Before the start of the pilot, only 23 percent of the 7th grade remediation students were proficient on the state mathematics test, but after the first year, the proficiency rate climbed to more than 40 percent, according to district data.

"The math class that they dreaded became something they really loved," Ms. Caldwell said.

While the Los Altos pilot has garnered most of the media attention, with the initiative's support from the Seattle-based Bill & Melinda Gates Foundation, it's only one of several similar experiments popping up in schools and districts across the country, Mr. Smith said. (Editorial Projects in Education, the nonprofit corporation that publishes *Education Week*, is also a recipient of Gates Foundation funding.)

For example, in one small-scale experiment at Alhambra High School in Martinez, Calif., Mr. Smith **found** that students in a computer-aided-design class whose teacher incorporated digital lessons for use at home performed better on a post-test than did students using the standard textbook and lecture.

### Student-Led Classes

Back at the Gwinnett School of Math, Science, and Technology, that has been Dr. Kramer's experience, too. A 17-year veteran who started teaching high school biology out of medical school, she said she had always been successful at the "traditional mode of lecture and lab and test."

Yet in recent years, Dr. Kramer said, she got the creeping sensation, even in Advanced Placement classes, that her students were changing and her techniques weren't working anymore.

#### Administrators



#### Teachers



#### Students



"I felt like I was working harder and harder, and the students were working less and less hard, and we weren't being as successful," she recalled. "I really felt like they need to be interacting with the material more than I am."

At the time, Dr. Kramer's colleague **John Willis**, who teaches freshman physics at Gwinnett, a 705-student district-run charter school, had just started to experiment with requiring students, two or three times a week, to view his recorded lectures and other materials online before class. He used short automatic-response quizzes at the start of each class to make sure students had seen the material; he then used the class time to dig into demonstrations and experiments.

Other teachers, including Dr. Kramer, signed on in part because the new format saved instructional time: Mr. Willis said that what used to be a two-class-period process to set the groundwork for a laboratory assignment has been moved online—mostly with student-made videos explaining the setup procedures and hypothesis planning.

"It allows me to improve the connections I'm making with students, because now I can get into the material in a deeper way," Mr. Willis said.

For a recent experiment using microscopes, Dr. Kramer and another biology teacher posted YouTube videos of scientists discussing the equipment, photos of the school's microscopes for the students to label, and their own videos explaining common problems in setting up the experiment.

"When [the students] came in, that shaved a half hour off what we would have normally had to eat up in lab," she said. "So at a time when we're trying to cram more into less, they're already coming in prepared and ready to go and that saved us a lot."

### **Issue of Scaling Up**

This school year, a half-dozen teachers at the Gwinnett school, part of Georgia's 161,000-student Gwinnett County district, have started using the flip model systemically, in subjects ranging from chemistry and physics to geography.

Jeff Burmester, a Gwinnett upper-grades physics teacher who was just named the district's teacher of the year, said both the class projects and the online data have given him much more insight into students' progress. "Before, you'd do some sort of formative assessment and eventually get feedback, but this is immediate, and it's relevant to what's going on in the class at the time," Mr. Burmester said.

Students said they've noticed the difference. Gwinnett senior Hannah Doksansky said the flipped format in Mr. Burmester's physics class has made homework interesting.

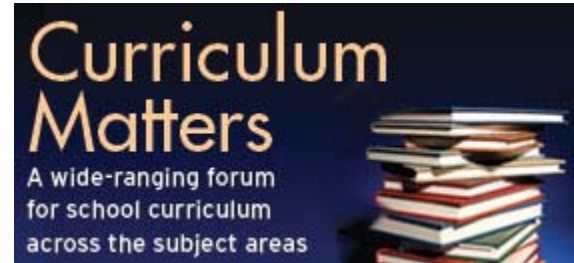
For example, Ms. Doksansky described using a computer application to aim and test-fire projectiles while changing their angle and velocity. Once in class, the students described their formulas for hitting targets under different conditions.

"It basically led us to a set of conclusions without him telling us the conclusions," Ms. Doksansky said. "We had to test it out on this little applet and figure it out. It was a much better explanation than the really boring one in the book."

Student engagement and accountability are critical, said Mr. Smith, the California researcher, because the flipped-classroom format requires students to commit to doing a lot more work on their own.

Both the Los Altos and Gwinnett pilots are still in early phases, and it will be a year or more before the schools have hard data on the effectiveness of the flip model. Moreover, both Ms. Gallagher of Los Altos and Mr. Smith caution that schools must invest in technology and teacher training before trying to implement this sort of untraditional format. The Los Altos schools and the Gwinnett mathematics and science school have laptops for students to use individually, a perk not available in most schools.

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Mr. Smith said that regardless of how the pilots shape up, more teachers will try out the flip model as they become familiar with online resources.

For Gwinnett's Mr. Burmester, the proof will be in classroom practice. "The critical thing about all this [technology] is, what are you going to do differently, based on it?" he said. "Without a change, it's just more stuff."

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