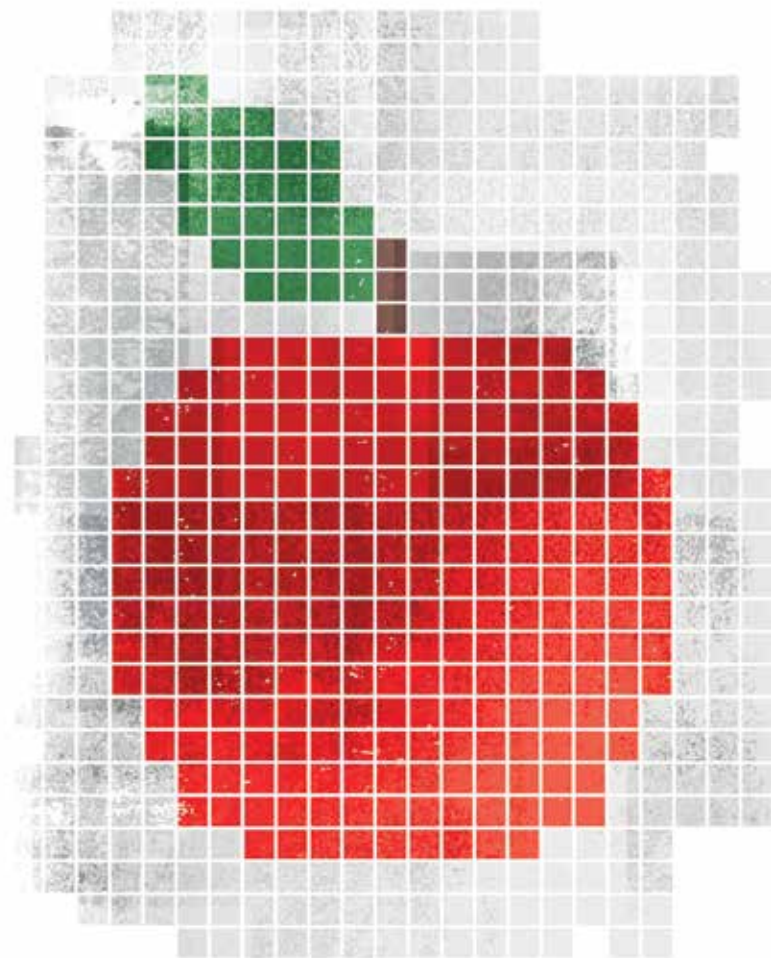# Rebooting the Classroom

NC State is helping educators make smart use of technology as students explore new ways of learning.

by Kristin Collins | Illustrated by Sam Ward

Elizabeth Kinlaw's fourth-grade class is a long way from the dated image of students sitting at neat rows of desks, hands politely raised while a teacher stands in front of a blackboard. In her classroom at Fuquay-Varina (N.C.) Elementary School, some students are draped over beanbags reading, some are working independently or in pairs, others are sitting cross-legged in a circle on the floor with the teacher, learning about point of view. Most of them have iPads instead of books in their hands.

This is the new model of education that is gaining traction across the country, one in which students learn in a collaborative, hands-on environment with a whole world of information at their fingertips. Classrooms equipped with digital devices for every student are still the exception in North Carolina and nationwide, as schools search for funding to get devices into students' hands—and struggle to provide the teacher training needed to make them useful tools rather than costly distractions. A 2013 survey of teachers by the Pew Research Internet Project found that only about half of teachers feel their students have access to the digital tools they need in school. In North Carolina, NC State's Friday Institute for Educational Innovation is working to change that.

The institute, which brings together researchers, teachers, school administrators, students and community members to foster innovation in North Carolina's classrooms, has spent years researching the best ways to use digital tools in public schools. In 2014, the institute signed a contract to help North Carolina bring digital learning to every classroom in the state.

"These devices, these are a kid's world," says Glenn Kleiman, executive director of the Friday Institute. "These devices give them power. To say, when you come to school, you shut all that off and use a blackboard and a pencil, that's saying school is separate from reality."

North Carolina lawmakers have gotten Kleiman's message. The state legislature recently passed a law requiring that public schools transition from textbooks to digital resources by 2017. Another law requires schools to create digital teaching and learning standards for teachers and administrators, also by 2017.

It is the Friday Institute's job to help the state figure out how to meet those deadlines—and also to outline a plan for how North Carolina will bring its classrooms into the digital age. The plan will include putting together a funding model to make the multimillion-dollar transformation possible. Kleiman says the plan is not merely about providing devices. Its aim is to give North Carolina a vision of an entirely different kind of classroom: A place where students might listen to lectures online at home and spend class time on collaborative projects; where online tools help them learn at their own pace and use materials tailored to them; where students could demonstrate their learning in different ways, depending on their interests and talents, rather than filling in bubbles on identical tests; and where teachers would act more as guides than as the final arbiters of knowledge.

A NEW MODEL

In the world Kleiman imagines, standardized testing could become unnecessary because, much as in video games, students will not advance until they have proven mastery of each step along the way. Even one-size-fits-all grade levels could become obsolete in a customized learning environment where students are at different places in every subject.

State leaders say they are relying on the Friday Institute to help them open this new world of opportunities to students. "We are in this amazing era in human history," says Tracy Weeks '99 MR, '05 PHD, who was hired last year as the first digital learning officer for the N.C. Department of Public Instruction. "We really want to work toward an era of personalized learning for all students in North Carolina."

Effecting a transformation in North Carolina's more than 2,500 public schools will not be simple. Public schools are complex institutions held accountable to educators, taxpayers, parents and politicians at every level of government—all of whom can have conflicting ideas about how best to educate children. Many public schools are also chronically underfunded, leaving teachers with limited time and opportunities to learn new skills or adopt new teaching methods. Kleiman says his job is to give North Carolina a common goal to work toward, even if progress comes slowly. "Our work is a success if we stimulate some good discussion and put a good plan in place," he says.

IN THE CLASSROOM

Kinlaw, the fourth-grade teacher in Fuquay-Varina, has been using iPads with her students for only a year, but she says she is already seeing the seismic shifts technology can make in the classroom. She says her students are more excited about learning. "It just fosters creativity, and it makes it fun," Kinlaw says. "We can do so much more so much faster."

Now, instead of taking quizzes on worksheets, her students often turn them into games. She projects an online quiz onto a SmartBoard, and students answer questions using their iPads while a countdown timer ticks and dramatic music plays. When everyone has answered, the music stops and a cheer goes up among the

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students. Kinlaw sees her students' answers in real time, allowing her to speed through questions that everyone got right and linger over those that caused confusion.

Kinlaw says the iPads have also made it easier for students to extend their learning and pursue their interests. When she read the novel *Stone Fox* to the class, and students started asking questions, she told them to partner up and research topics from the book. During a recent English-Language Arts class, pairs were using iPads to research topics such as the Shoshone Indians and the Iditarod sled dog race, and creating online books, audio presentations and videos about their findings.

Just a few months into fourth grade, the students already look like pros as they navigate their school-issued iPads, each cradled in a sturdy rubber case. They type with the alacrity of adults, know how to sift through Internet sources for reliable information, and use their fingers to slide photos and text into place on documents.

Nine-year-old Julisa Mancia was researching the Shoshone Indian tribe with a partner, and in a few minutes, they had compiled an impressive list of facts. Julisa says she had never used a tablet before fourth grade, but she seemed to

have already forgotten that there was any other way to learn. "Without technology, it would be like we learn nothing," she says. "We wouldn't even know about the dinosaurs that lived before or anything. We'd be like cavemen!"

For the moment, however, Kinlaw is the only teacher at Fuquay-Varina Elementary, and one of only a few in Wake County, whose students all have tablets. She has created her online curriculum by herself, and she says her biggest wish is for other teachers to collaborate with.

TECHNOLOGICAL LINKS
The Friday Institute says building connections between educators who are using technology in the classroom is key to expanding digital education. Mary Ann Wolf is the institute's director of digital learning programs, and that's a big part of her job. Wolf says North Carolina has already made important strides toward modernized classrooms. The N.C. School Connectivity Initiative, started with funding from the state legislature in 2006, has helped most schools get connected to the Internet. And the numbers of computers and tablets in schools has been expanding rapidly. In some places, such as Fuquay-Varina Elementary,

principals have pulled together private and discretionary funds to purchase devices. In other schools, grants from organizations such as the Golden Leaf Foundation have enabled every student to have a laptop or tablet.

Now, Wolf says, the Friday Institute is trying to grow those seeds. She leads a team of coaches who work in high-need districts across the state. They run a summer boot camp for teachers to train and inspire them with digital learning tools, and they bring teachers together at digital learning institutes throughout the school year. They have 50 North Carolina principals enrolled in an 18-month leadership program that teaches them what digital learning looks like and how to create a culture where it can take root.

Wolf says good teachers are as critical as ever in a digital classroom; they simply have better tools to engage their students and customize their teaching to their students' needs and interests. "When I go into classrooms where this is really working, it's actually noisy and chatty," Wolf says. "You might see one group working together on a project, and another sitting at a table with a teacher getting specific instruction, and maybe another group reading in a corner. There is a lovely hum of energy."
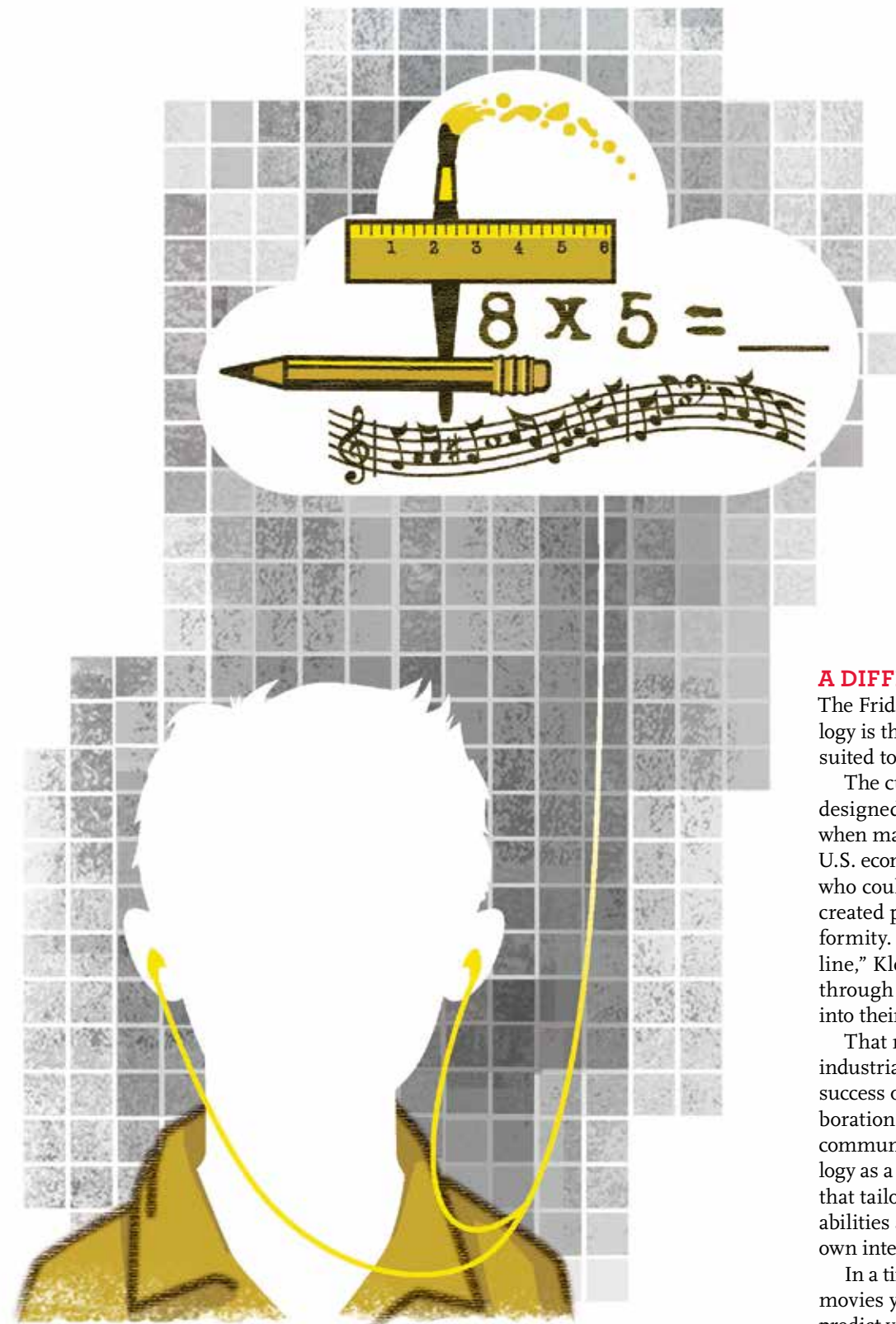
A DIFFERENT WORLD
The Friday Institute's leaders say technology is the key to building schools better suited to a radically changing society.

The current public school model was designed 100 years ago, during an age when manufacturing was central to the U.S. economy. The nation needed workers who could fill prescribed roles, and it created public schools that prized uniformity. "The model was the assembly line," Kleiman says, "with kids moving through and knowledge being plugged into their heads."

That model does not fit today's post-industrial economy, in which a worker's success often depends on creativity, collaboration, problem solving and skillful communication. Researchers see technology as a powerful tool for creating schools that tailor instruction to each student's abilities and allow them to pursue their own interests.

In a time when Netflix can guess which movies you will enjoy and Amazon can predict your next purchase, Kleiman says, schools should be able to use the same

tools to create a unique educational experience for every student. "We live in this customizable, personalized world, and we're trying to bring that to education," he says. "We're really talking about giving kids tools no past generation has had."

In addition to their on-the-ground work in schools, the Friday Institute is leading research to create the tools that will help schools realize the potential of the digital age. In labs and classrooms at NC State, researchers are building online learning platforms that operate like video games and designing experimental curriculums based around complex problem solving.

NC State psychology professor Roger Azevedo, who works closely with the institute as part of NC State's Digital Transformation of Education Cluster, is using computer programs to detect facial expressions, eye movements and brain activity as students learn online—and analyzing that information to create the best learning environment for each student.

Those projects represent some of the university's most aspirational work in digital learning, giving a sense of what's possible in the future. In the here and now, however, change will likely come in small, incremental steps. School districts across the country have demonstrated the risks of jumping into the digital age too quickly, without enough planning. In Los Angeles, the superintendent was recently forced to resign after a plan to buy iPads for every student in the district dissolved amid concerns about costs, software glitches, poor training and online security.

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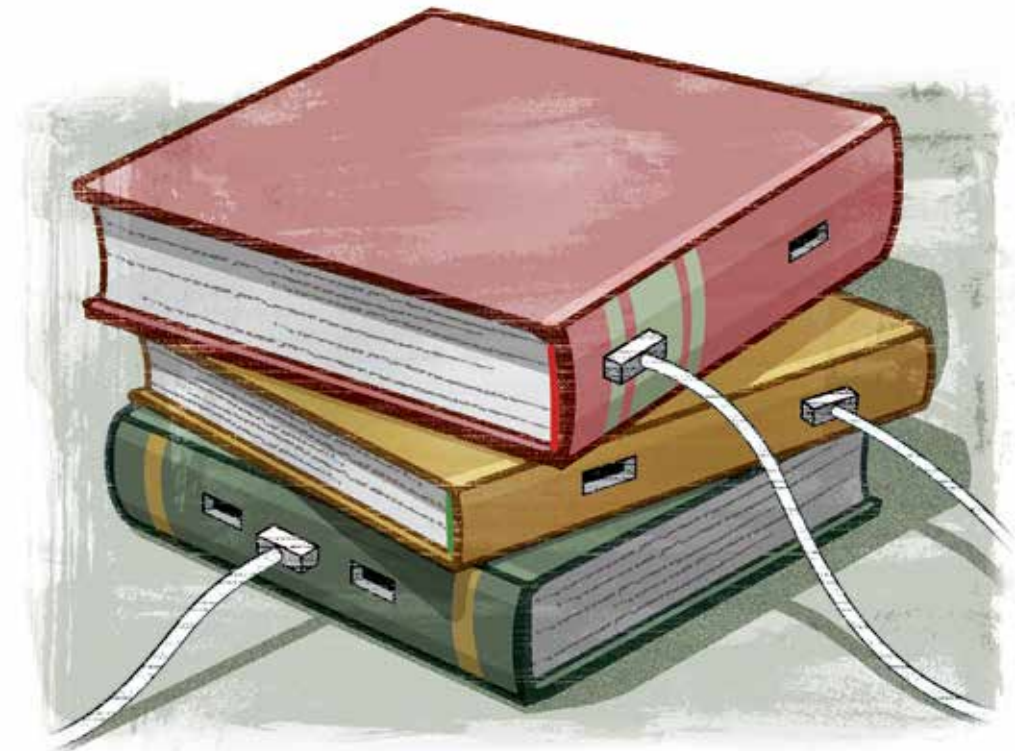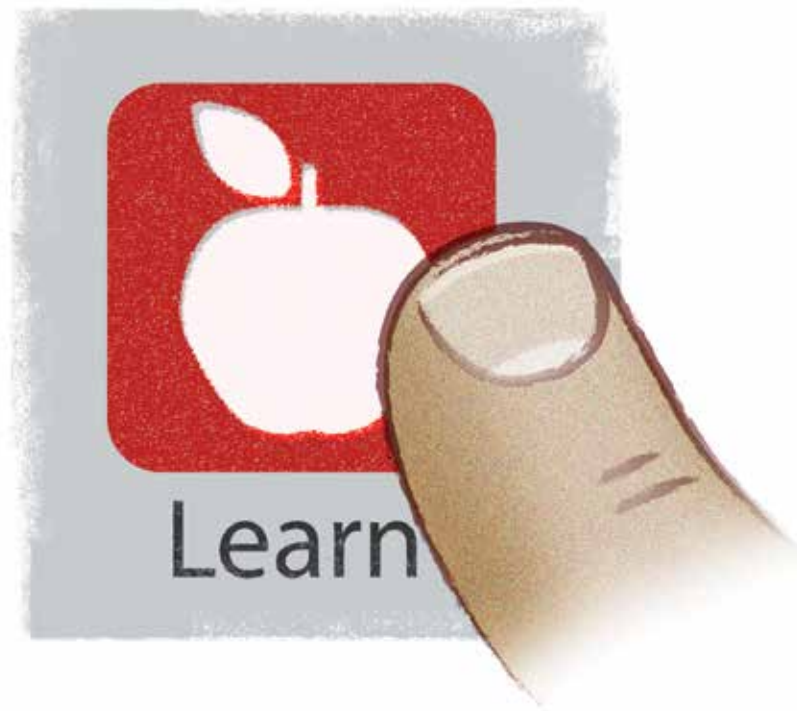
A TEACHER'S AIDE

Kleiman describes technology as a sort of magnifying glass that amplifies a teacher's strengths and weaknesses. "If you're doing bad educational practices, technology can make it worse," he says. "It's not some magic solution."

However, leaders at the Friday Institute say it is wrong to dismiss the importance of technology simply because it can be a distraction, or because it opens doors to information that makes some people uncomfortable. They say the problems that devices present are part of life in the modern world. As students learn to problem-solve glitches, overcome the temptations of their constant connectivity, and filter the skewed information from the reliable, they are learning what the Friday Institute calls "digital citizenship."

"That's something you really can't learn with three books in front of you," Wolf says.

Wolf and others at the Institute point to places like Balfour Education Center, an alternative school in Henderson County, in the North Carolina mountains, to explain why the benefits of technology outweigh the risks.

When Kent Parent took over as principal in 2012, this school for students who had left or been expelled from traditional school had a graduation rate of about 50 percent. In the 2013–14 school year, the graduation rate was 80 percent. Parent gives a big part of the credit to a new program, funded by the Ben Stiller Foundation, that puts iPads into the hands of every student. Parent is also part of the Friday Institute's digital learning leadership program for principals.

Parent says the old model in which students learn the same information at the same pace just didn't work at a school where students have large gaps in their education. Teachers now use online tools to assess students and help tailor a curriculum for their level.

Balfour is using devices to allow students to take charge of their own learning and work collaboratively. Students in an electronics class were asked last year if they were interested in building a drone. They were immediately interested, but Parent told them he had no idea how to build one. So he challenged them to come up with a design, a budget and a plan for procuring the parts.

He says they will learn all the same lessons as in a traditional electronics lab, but with a sense of purpose and independence.

"As teachers, we're transforming and letting go of having control of all the knowledge," Parent says. As for the students, he said, "I think the number one reason why kids drop out of school is because they're bored, and they're not connected to the school. Our students, they're not bored anymore."

Kristin Collins is a freelance writer in Raleigh.