Teaching in the Age of Technology

robotics class constructing an electric car from the ground up, youngsters learning to read with the help of iPads, a computer in the hands of every student: These images of education today would have seemed far-fetched in the last century.

But now, this is reality. Technology is everywhere, from the phones in our pockets to the cars we drive to the computers we use at our jobs. It helps us cure disease, address environmental problems, and build community across the globe. Students entering the workforce in the coming decades will need to be knowledgeable of and fluent in these ever-changing tools in order to succeed.

For today’s students, using apps and navigating the internet is as intuitive as writing with pencil and paper was for previous generations. Our local teachers are being called upon to change the way they teach to reflect this new world, incorporating technology into many aspects of their instruction.

At the same time, none other than Microsoft founder Bill Gates reminds us, “Technology is just a tool. In terms of getting the kids working together and motivating them, the teacher is the most important.”

Educators throughout Sonoma County are at the forefront of this effort to increase the thoughtful and purposeful use of technological devices in the classroom in order to better prepare their students for the future, while also maintaining outstanding instruction in the core areas such as mathematics, language arts, and social sciences.

Vanessa Vega of Edutopia tells us, “At the heart of effective technology integration, technology offers opportunities to be more actively involved in the learning experience.”

Used the right way, the application of hands-on learning to solve real world technology problems in the classroom can deeply enhance student engagement and buy-in.

This year’s Spotlight features just a few of the exciting ways cutting-edge devices and concepts are being integrated into subjects ranging from reading to environmental science to robotics. Please enjoy these stories of how students are exploring, creating, and being challenged in unprecedented ways.

“If we teach today’s students as we taught yesterday’s, we rob them of tomorrow.”

- JOHN DEWEY

Steven D. Herrington, Ph.D.
SONOMA COUNTY SUPERINTENDENT OF SCHOOLS

More facts at scoe.org/ed-facts

Number of school districts in Sonoma County

- Elementary: 31
- High School: 3
- Unified: 6

Number of school districts in Sonoma County

- 2014-15 graduation rate: 83%
- 2009-10 graduation rate: 75%

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- National Blue Ribbon Schools: 10
- California Distinguished Schools: 79
- California Gold Ribbon Schools: 6

- White: 45% (31,867 students)
- Hispanic/Latino: 44% (31,104 students)
- Asian, Pacific Islander, Filipino: 4% (3,150 students)
- Multiple or no response: 4% (3,029 students)
- African American: 2% (1,241 students)
- Native American: 1% (705 students)
A Physics Lesson, On Wheels

With the red velvet curtains pulled back onstage in the multipurpose room at Healdsburg Junior High, an interesting scene unfolds: middle school students move with purpose under the glowing lights, some attaching new parts onto a shiny red vehicle frame, others connecting wires in a complex control panel.

This isn’t a play. It’s the school’s robotics class at work on a state-of-the-art project to create a street-legal electric car—and learn important concepts about physics, mechanics, ingenuity, and teamwork while they are at it.

In the 2015-16 school year, Healdsburg Junior High was one of five schools, and the only junior high, to participate in this electric vehicle grant program in partnership with the Career Technical Education (CTE) Foundation, Sonoma Clean Power, Sonoma County Office of Education (SCOE), and SWITCH vehicles. Through this program, the CTE Foundation provides grants to schools around the county to create hands-on programs aligned with Sonoma County economic and workforce needs. (The following local high schools also received this grant: Santa Rosa, Petaluma, Analy, and Archbishop Hanna.)

Each school started with a kit from the SWITCH Lab, a Sebastopol company that began by making simple, low cost, yet fully functional electric cars. Their model morphed into an educational program that has been adopted by high schools and colleges across the country.

Each kit includes all the vehicle components, a detailed instruction manual, teacher training, and related curriculum based on Common Core and Next Generation Science Standards.

Ron Bilberry, a conceptual physics teacher, is running the program at Archbishop Hanna High, a school for “at-risk but motivated” boys. He says his students responded to the project “amazingly well,” propelled by the idea they would be able to drive the car they created.

“As far as a learning tool, it’s awesome,” he says, adding that many aspects of the project, from electricity to batteries to the concept of torque, tie into his curriculum. “I’d love to see it in all the schools.”

Healdsburg teacher Patricia Murphy says building a working car during her training lit a spark. “I was so empowered and excited when I built it,” she says. “I was amazed by the thought of what it could do for students. Not everyone learns from a book.”

Her class set the goal of finishing its vehicle in time for Healdsburg’s Future Farmers of America Parade in May. With many students staying five hours after school before the parade to complete the finishing touches, the class met its goal. Student Diego Carlino earned the right to sit in the passenger seat beside Ms. Murphy on the day of the parade. Other students took turns sitting on the back holding signs while others walked and waved.

“They were beaming,” she said.

Something for Every Student:

Used well, technology can provide students with different learning styles multiple ways to learn the same material.

“I was amazed by the thought of what it could do for students. Not everyone learns from a book.”

-Patricia Murphy
Placing Students at the Center of Learning

“I like passing the levels, it’s like a game. And I love getting certificates!”

-ASHLEY CASTILLO

Literacy and math skills are transcending the pages of books for today’s students with the advent of electronically administered programs. Sheppard Elementary School, located in the Roseland School District, recently made a commitment to integrate two such programs into their curriculum—Lexia Reading Core5, for literacy, and DreamBox Learning, a math program. Both provide instruction that is adaptable to individual student needs. The software offers a game format, is accessible via tablets, and has proven to be a favored activity among many students, particularly those in the classroom of second-grade teacher Melanie Lowe.

As part of Sheppard’s math ad hoc committee, Ms. Lowe was among the handful of teachers to pilot DreamBox in her classroom before its school-wide implementation in 2015-16, which ran concurrently with the school’s rollout of Lexia. Audio guides children through the computer-based learning process. The program conducts an initial assessment of their abilities and uses that to customize instruction. DreamBox and Lexia are added components to the curriculum, counting toward required English Language Development (ELD) minutes. Effectively integrating these new elements into instruction requires balance and flexibility. “Taking time to fit everything into the school day has its challenges,” says Ms. Lowe. But the rewards are clearly worth the effort. “The programs are great because they are adaptive to the students’ levels. The students receive varied content based on their individual needs.”

Students especially enjoy their time on these programs for their game-like quality. Some second-grade Lexia activities include building word and sentence chains and learning about suffixes and prefixes. Students who are higher-level readers often work at a third-grade level, while those needing extra help are able to focus on the foundational skills they need. Similarly, with DreamBox, students work on number lines and other grade-appropriate math exercises that adjust to their level of comprehension. When students struggle with a certain concept or skill, progress reports from both programs alert Ms. Lowe on her computer through the teacher dashboard, which generates lessons based on the students’ individual needs and provides predictors for the students’ performance. This allows her to pull students aside for one-on-one time to work on the specific skills they need help with.

Ms. Lowe has established a rewards system in her class, issuing certificates to students at the end of each week as they pass levels in the programs. This positive reinforcement creates a gratifying experience for the students. “I like passing the levels, it’s like a game,” says student Ashley Castillo. “And I love getting certificates!”

ADAPTABILITY:
Technology can be adapted to meet individual students’ learning styles and needs.
n a warm spring day, eight Mark West Elementary sixth graders make the five-minute walk from their campus to the banks of Mark West Creek with their teacher, Gary Graves. Along the way, they apply what they’ve learned about the local ecosystem: “I see deer tracks!” shouts one boy excitedly. Then, one by one, the students leap across the rippling water to reach the area where they can get to work measuring water temperature, PH, and dissolved oxygen.

Such trips are a weekly aspect of Mr. Graves’ yearlong, integrated instruction on Steelhead trout and the local watershed. In this popular program, students become invested in what they are learning as they monitor and help improve the quality of the creek so threatened Steelhead can thrive.

And while the subject is the local environment, Mr. Graves has purposefully incorporated technology into the program.

“Every time we leave the room, we make a new video,” he explains. Once back in the classroom, students enter their new data into a Google Docs graph that tracks changes in the water quality. Then they upload it and the video to a class website. It’s a way for parents and the community at large to understand what the students are doing—and for the students to feel invested in their work.

“Without a doubt, it’s my favorite part of the day,” says Mr. Graves. “If you have a kid who doesn’t do well sitting in a desk, in this trip they come to life as a scientist.”

The students’ engagement is obvious as they reach over branches to dip water samples from the creek and gather together to take measurements.

One student explains why the measurements matter: “If there’s more dissolved oxygen, then the fish like to live there,” he says. When the measuring is done, the students just as eagerly rally to pick up all the trash before heading back to school.

Mr. Graves encourages students to take ownership of the program. After school one day, several students stay behind to work on projects related to the Steelhead program. Mia updates the website while Nolan and Boston collaborate on a digital slideshow documenting the watershed project, which they later present at Sonoma State University’s School of Education on behalf of Mr. Graves’ teaching assistants.

The students say they like being out in nature, then applying technology to their experience.

After a while, Nolan’s mother arrives to pick him up and smiles at his enthusiasm. She says of Mr. Graves’ class, “He instills a passion in them that’s just amazing.”

“Without a doubt, it’s my favorite part of the day. If you have a kid who doesn’t do well sitting in a desk, in this trip they come to life as a scientist.”

-GARY GRAVES

LEARN MORE: ggrave4.wix.com/mark-west-steelhead
VIDEO OF SSU PRESENTATION: ggrave4.wix.com/mark-west-steelhead#video-reel
Supporting Student Filmmakers

From filming to editing videos to writing scripts, there is no shortage of opportunities for students enrolled in Sonoma Valley High School’s Media Arts program looking to find their niche in film production. Students who desire to be in front of the camera have their place as well, taking on roles as actors and news anchors. Comprising a series of video and broadcasting classes taught by Program Director Peter Hansen, the Media Arts division has a long-standing reputation as a training ground for aspiring filmmakers. His courses employ video as a powerful vehicle to instill in them industry-relevant skills that they will use throughout their academic careers, on the job, and in life.

First-year students start off taking Beginning Video and then proceed to Advanced Media, where they can really develop an expertise. No matter their specialty, students get a comprehensive taste for the subject in Mr. Hansen’s classes. “Students walk away with varied skills matched to their individual strengths and interests,” he says. “But the classes involve them in all aspects of film production.”

Mr. Hansen’s Advanced Media class members can be seen collaborating as they prepare to shoot a student-run broadcast—setting up teleprompters, adjusting lighting, practicing lines, and experimenting with different equipment and software programs.

The key to fostering such a high level of student engagement lies, it seems, in the specificity of the work. One graduating senior, Fabian Metelman, says he has developed a passion for sound design and music theory and plans to attend college in Germany this fall to study music production. Students have also pursued degrees in other specialized areas such as lighting, while others have gone straight into careers in video production—making this true Career Technical Education (CTE). The school’s partnership with cable channel SUN TV is yet another venue for students to pursue careers in the industry, offering internship positions to third-year participants.

The Media Arts program also has strong ties to the Sonoma International Film Festival, a prestigious event hosted at the Sebastiani Theater in Sonoma, where the work of hundreds of diverse filmmakers is shown every year. The festival has given huge support to the school’s program over the years, says Mr. Hansen. His students can submit films to the student showcase portion of the festival, providing them not only an opportunity to earn scholarship awards but also a setting to have their work viewed by a wider audience.

“Students walk away with varied skills matched to their individual strengths and interests. But, the classes involve them in all aspects of film production.”

-PETER HANSEN

Making Learning Memorable:

SCOE’s annual Five-Minute Film Festival, a countywide event, is designed to allow students to explore core subjects like math, science, and English through a creative medium. Every year, K-12 students submit films created in alignment with their area of study and have a chance to showcase their work in front of a community audience at a public theater. The projects help students master an idea and ties their learning to an experience they’re not likely to forget. Learn more at scoe.org/film.
Swapping Paper for iPads

"The rewards of having them be able to move around has pushed me as a teacher to approach student-centered learning more than I have in the past; it pushed me to hand the reins over to the children."

-KIRI BAILEY

DIGITAL CITIZENSHIP:
As internet usage becomes more abundant in schools, educators, parents, and students are being encouraged to establish a set of ground rules for good online behavior. Often referred to as digital citizenship, these guidelines can help promote responsible internet usage for students of all ages—from preventing bullying to promoting privacy and safety measures to identifying how much screen time is appropriate for very young children. For more information, visit scoe.org/safety-internet.

For many, the word "classroom" brings to mind images of pencils and paper, a teacher writing on a blackboard with chalk, and students quietly seated in rows of desks. But a look around Kiri Bailey’s third-grade classroom at McDowell Elementary School reveals a different scene—students actively engaged in their learning, using district-assigned iPads and other technology to complete lessons. Individual desks and chairs are swapped out for colorful cubes, moveable chairs, beanbags, and group tables, while a large TV screen replaces a traditional blackboard. Portable whiteboards create different levels of writing surfaces for both the students and teacher. The furniture, which changes according to grade level, is intended not only to encourage collaboration but also to be compatible with a child’s natural tendency to move around.

These updates are part of a district-wide initiative across Petaluma City Schools’ K-12 campuses to provide each student personal access to technology and revamp classrooms with furniture designed to facilitate collaboration and encourage movement. This effort complements the California State Standards and aims to equip students with the essential, up-to-date skills they will need to succeed in the modern era.

Ms. Bailey welcomed the change in her classroom at the start of the 2015-16 school year. The personalized environment enables students to "experience more ownership over their learning." She says, "The rewards of having them be able to move around has pushed me as a teacher to approach student-centered learning more than I have in the past; it pushed me to hand the reins over to the children." The initial stages of implementation involved some trial and error, but Ms. Bailey found the students quickly adapted to their new setting.

In a recent activity, students created e-books about living things in a saltwater marsh ecosystem. Using their iPads, students labeled images of organisms using an app called Explain Everything, then met with a peer to check their work. They used the voice recorder feature to make a script describing what they’d labeled. In another project, students learned how to do green-screen casting, using their iPads to record each other giving weather reports from countries around the world. They then marked those specific countries on a map with QR codes that could be scanned and viewed using an app.

The iPads have also given Ms. Bailey an opportunity to reach parents in a new way, especially those without computers. She developed a bilingual classroom website and newsletter to communicate with Spanish-speaking parents. She created this using Google Classroom and Google Translate, then secured it on the home screen of each student’s tablet. At home, parents can access the iPads to stay informed of school assignments and activities.

For more information, visit scoe.org/safety-internet.
Maker education—hands-on, interactive learning focused on creating and problem-solving—is taking off around the nation, and Sonoma County is a leader in the movement. Many schools have created makerspaces, which are rooms or areas stocked with tools like 3D printers, laser cutters, computers, construction equipment, and more.

But even schools and classes without dedicated spaces can incorporate making into almost any subject matter with just a few simple tools and an open mind, according to Casey Shea, SCOE’s Maker Education Coordinator and creator of the country’s first make education program at Analy High School.

“It’s not really a toolset as much as a mindset,” he says. That mindset includes allowing students to take ownership of their learning, pose their own problems, and find solutions, he further explains.

Such an approach is on display at Piner-Olivet Charter School as students in Gary Jordan and Susan Donner’s eighth grade math classes work in teams to produce and market T-shirts to their peers. Each team creates a design for their shirts, researches production costs, and determines the price and volume of sales they need to be profitable. Then the class votes on their favorite design, which is produced using a machine called a vinyl cutter. It prints vinyl designs that can then be placed on a T-shirt using a heat press. The project helps students see the connections between math and the real world as they use formulas and equations to determine their company’s profitability.

The vinyl cutter is a good starter tool for a school or teacher because it is relatively low cost and can be moved from class to class for various projects, according to Mr. Shea.

Mr. Jordan shares that it has been very useful at his school, allowing students to turn designs they’ve made on the computer into stickers, banners, T-shirt logos, and more.

In El Molino High School’s engineering and design class, led by Mary Beth Smith, the vinyl cutter is a popular option among a host of tools students use. The class consists of students grades 9 through 12, and all ages can find uses for the vinyl cutter.

Ms. Smith says, “They like working and designing on computers, but if they can get something real out of their work, that’s really nice.”

Jocelyn, a sophomore, recently used the vinyl cutter to make a band logo, among other things. “It is really cool because you can make multiple colors and layers,” she says of the vinyl cutter. “I’ve always liked making stuff, taking things apart and rebuilding them.”