Case study

Bonsall High School

New Tech model school unleashes innovation with Sprout by HP

Industry
K-12 Education

Objective
Engage students in creative team projects focusing on project-based learning

Approach
Deploy HP Sprout all-in-one computer featuring webcam, projector, touch-mat display, advanced 3D scanning, and optional 3D print possibilities

IT matters
- Provide students with an immersive multi-touch experience
- Unleash creativity with capture-and-change technologies
- Integrate revision and documentation into student-project lifecycle

Business matters
- Reinvent educational paradigm
- Enable project-based, hands-on learning
- Blend fact-based knowledge with critical-thinking skills
- Improve student outcomes, college and career readiness

"Sprout gives us a powerful new technology to support collaborative, project-based learning, integrating theoretical knowledge with hands-on experience."

– Lee Fleming, principal, Bonsall High School, Bonsall, Calif.

Bonsall High School in California's San Diego County is one of approximately 150 New Tech model schools in the United States, where innovations in experiential learning foster college and career success. Moving beyond technologies that merely mimic traditional educational strategies, the high school uses a new kind of all-in-one computer—Sprout by HP—to fundamentally change the classroom experience. The result is highly engaged students who can creatively define and solve real-world problems.

The Bonsall Unified School District is small, with fewer than 3,000 students, and quite diverse. Bonsall is located on the outer perimeter of San Diego County. The area is a combination of horse ranches, several well-known equestrian centers, avocado growers, nursery and greenhouse businesses, the Pala Band of Mission Indians and military families from nearby Camp Pendleton.

"It's a diverse community with many different cultural components, but a unifying factor is friendliness—a nice small town feel," says Lee Fleming, principal of Bonsall High School.

School aims to change educational paradigm

Project-based learning. Paradigm-shifting use of technology. Student empowerment. Bonsall wanted to give every one of its students the best possible chance of a successful life and career. To this end, it opened Bonsall High School in 2014 as one of just 20 New Tech schools in California. As the term "New Tech" implies, Bonsall High integrates technology into its classrooms, including a 1:1 program placing technology into the hands of every student. However, the high school goes beyond that to leverage technology creatively to effect meaningful improvements in education.

"Technology has been available in the classroom for a long time, but it's been used mainly to make it easier or faster to do what's always been done—taking notes on the computer instead of on paper, for example," Fleming says. "We didn't want to reinforce traditional paradigms, we wanted to change them. We aim to raise up a generation of students who are not just problem solvers but problem finders."

Sprout by HP enables innovative vision

World Studies Teacher Daniel Costa isn't afraid of breaking new ground with the next unique project for his classroom. Costa is fascinated by Rube Goldberg machines—those complicated chain-reaction devices that combine whimsy with engineering. He's also interested in World War II. Costa, whose classes combine history with language arts, imagined teaching about World War II by having his students work in teams to build Rube Goldberg machines.

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> – Lee Fleming, principal, Bonsall High School

Events of the war would be represented as objects, which would interact to unfold the next chain of events that impacted a country and ultimately the war. Sitting in his classroom was the ideal enabling technology: the HP Sprout.

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Sprout is a new kind of all-in-one computer. Powered by Microsoft® Windows 10 and an Intel® Core™ i7 processor, Sprout includes a webcam, a projector, a touch-mat display, advanced 3D scanning, and 3D print connectivity.[1] Users can grab an object from the real world, manipulate it in the digital world, and bring it to life in a physical space. Because all Sprout interaction surfaces — including the Integrated Display and the HP Touch Mat — handle multiple touch points, Sprout can be used by multiple students simultaneously. The device engages all of a student's senses while supporting both collaboration and personal exploration.

"The HP Sprout capabilities support the project-based learning philosophy of our school, which emphasizes hands-on, real-world experiences that teach teamwork and critical thinking."

– Daniel Costa, World Studies teacher, Bonsall High School

Costa set the student-team project ground rules, adapted from the Rube Goldberg National Competition criteria. Each team would represent a country that was part of World War II. Each Rube Goldberg machine would represent a visual timeline of the war, with a minimum of 10 steps covering a minimum of five historical events. The 200 point final assessment considered such criteria as collaboration, content requirements, and the working capacity of the machine.

Students leveraged the technology capabilities of Sprout—which include mashups and layouts; stop-motion animation; video capture; and tracing and stenciling—to create their projects. One student, for example, used a scanned image of the Eiffel Tower to create a cardboard model representing France.

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Students were challenged with creating their total projects with recycled materials; there was no budget for supplies. A surplus storage room was opened for scavenging. A child's desk, a small bookcase frame, wood remnants and various unrelated objects were carefully selected as imaginations ran wild. Other materials were brought from home with dominos for the classic Rube Goldberg chain reaction. Tools, paint, string, glue, nails, and the most coveted—tape—were essential in the building process. And the creativity was messy extending indoors and out.

To get their Rube Goldberg machines working properly, the teams had to make multiple revisions—an essential real-world skill. "It's important to our school to create a culture of revision," Fleming says. "So students create a draft, but realize the draft is never finished. You just meet a deadline."

In this case, the schematic plan, symbolic events and project development were documented with the Sprout for the final presentation. But if the Rube Goldberg machine didn't work properly, there was an obvious need for revisions. Trial after trial of marbles, dominos and numerous moving parts proved a black-and-white result of success or failure. And the process of revision was a huge part of the learning, Costa explained. Students realized their ability to fine-tune and improve their project was only limited by time, so they were making arrangements to come in before school, during lunch and after school.

They also had to learn collaboration and compromise—and that the best teams are made of diverse and complementary skill sets not necessarily found among best friends. The HP Sprout also enabled teams to document their final project and pass on their experience to future students.

Thinking deeper

A student who represented the Soviet Union in the World War II project described the impact. Traditional teaching, the student said, transmits facts that eventually may be forgotten. In the Rube Goldberg project, they had to think deeper. They had to consider cause and effect. They had to create objects

that symbolized events, and place them in a context that communicated without words. The project-based approach focused on human aspects of the war and made students think about how not to repeat history's mistakes.

"I believe it's important to give the historical facts, the important people and dates," says teacher Costa. "But everything within history is debatable. If you were Truman, should you have dropped the bomb? Was it a better option than invading mainland Japan? I hope that through the way I teach, students will relate to events that happened years ago."

Bonsall High School has just scratched the surface of innovations made possible by HP Sprout. Costa today is learning more about the device's rich capabilities, and imagining new ways to use them. "My students challenge themselves and they have fun," Costa says. "When they finish a project and have actually created something with the technology, they remember it. It becomes part of them. Sprout is planting seeds of knowledge that will grow throughout their lives."

Costa is already thinking ahead to next year, lessons learned and how to build upon the experience with the project and technology. "Being an early adopter to drive new projects is dirty and messy," he says. "But that's where you get the good stuff. I will continue to push other teachers to be risk takers, use the Sprout technology, get the kids in front of it and get out of the way."

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