HOW TO HANDLE DEVICE MANAGEMENT
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BUILDING LITERACY AND CONFIDENCE WITH ELLS THROUGH SCIENCE

How do you get ELLs engaged in science when basic words like theory, lab, and experiment aren’t yet part of their vocabulary? Many districts face this challenge, including San Elizario (TX) ISD (SEISD), where 51 percent of the nearly 4,000 students are coded LEP and over 95% are economically disadvantaged. But thanks to dedicated, well-trained teachers using strategies including GLAD (Guided Language Acquisition Design) and Interactive Word Walls (by Dr. Julie Jackson) and some innovative edtech tools, these students are rising above these statistics and engaging in an array of creative science projects that build skills, knowledge, and confidence.

INVENTIONS AND ELEVATOR PITCHES

Each year, elementary, middle, and high-school students at SEISD submit either an “Invention” (created using components that already exist) or an “Innovation” (created from scratch) at a STEM Expo. Students can work individually or in pairs or small groups. “Working in pairs or groups is particularly beneficial for ELLs,” says instructional officer Debbie Cortez, “because it allows them to speak and listen to English in a friendly, low-pressure environment. This hands-on, collaborative learning also makes academic vocabulary come to life.”

The winning students from each school then present their inventions at a district-wide competition with a three- to five-minute elevator pitch. Cortez says this experience helps ELLs “further develop and refine their English skills,” in addition to building confidence in a supportive, fun environment.

SEISD is also hoping to build on the success of last year’s inaugural district-wide STEM Tank competition for third through eighth graders. “The top 20 inventions at each campus qualified to attend our first annual STEM Camp,” which included workshops on robotics, biomedical science, and character education, says Cortez.

Other innovative programs at SEISD include a Mars Challenge for high-school students, who are working on Mars-survival projects, and an after-school STEM dolls group for fifth- and sixth-grade girls. Last year the girls engaged in weekly STEM activities, and this year they’re learning robotics and will be competing at the end of the school year.

STEMSCOPES AND THE 5ES

Cortez says that “Accelerate Learning’s STEMscopes has really paved the way for our science instruction” (a Spanish version is also available for K–5). Units are developed around the constructivist 5E Instructional Model—Engage, Explore, Explain, Elaborate, and Evaluate—with additional modules for Intervention and Acceleration.

“The Explain and Elaborate phases are particularly helpful for ELLs,” says Cortez, and “students are now more willing to participate and take chances with vocabulary.” Students conduct inquiry-based science investigations in the Explore section, and during the Explain phase they collaborate in groups and use interactives to share their explanations of the Explore activities.

“In the Elaborate phase,” Cortez says, “students are challenged to extend their conceptual understanding and apply their skills through cross-curricular connections to reading, math, engineering, and other areas.” Engineering projects undertaken during the Elaborate phase promote scientific inquiry and literacy by giving students “the opportunity to apply what they’ve learned to real-world problems through group design projects. Students research, brainstorm, explore, build, test, and adjust.”

Both teachers and students feel very comfortable using STEMscopes, Cortez says, and many teachers also use the program 1:1.
REAL SCIENCE IN THE REAL WORLD

But CCSS students also have opportunities to design and implement solutions to real-world problems outside their classrooms, thanks to The Coweta STEM Institute (CSI), a collaboration between the district and the local business community. Yamaha Motor Manufacturing, for example, a large employer in the county, funded a student “handprinting” project. “Handprinting,” White explains, “is about leaving positive environmental impacts on the world.” Students at Eastside Elementary School identified air pollution as the problem they wanted to address. “They researched ways to improve air quality and designed some landscaping installations to help improve air quality,” White says. “They’re currently monitoring the air quality around their school using an air quality meter that measures particulates. Yamaha paid for the landscaping and the air quality meter. Their employees also supported the effort with their time.”

CCSS has also implemented a STEM Internship program, which gives eleventh- and twelfth-grade students “the opportunity to try on a career by working alongside people who are actually doing the job they want to do,” Student interns work in a variety of industries in the community.

White’s favorite story “is about a senior who wanted to be a civil engineer like his father and grandfather before him.” His internship involved working with a civil engineer for a few hours a day at the local water utility, helping to move sewer lines as part of a major road construction project. “As a result,” White says, “he decided he didn’t want to be a civil engineer.” White was concerned that the “family tradition” had been broken, the family was grateful—the program saved their son from spending “two years at Georgia Tech to figure out that he didn’t want to be a civil engineer.” The student is now a successful environmental engineer.

WITH HARD WORK AND SOFT SKILLS, STUDENTS ARE AHEAD OF THE GAME

Innovation, success, and leading-edge concept aside, Rachel Gardner’s story is an old one—a gifted, dedicated teacher-mentor invests time and trust in a student, and that student blossoms. In the next chapter of Gardner’s story, though, she passes her knowledge and leadership responsibilities on to other students. Gardner, now a freshman at Stanford University, laughs when she says that she’s now “just the founder” of Chap Research, an innovation program based at Westlake High School in Austin.

When Gardner’s robotics mentor Eric Rothfus asked her to design a prototype for The ChapR, a remote to control the robots they were building, he coached her through the entire innovation process—including product development, sales, and marketing. During the course of this year-long cycle she brought other students on board to work on the project as well. So far so good.

But once they had a prototype, Gardner had to step out of her comfort zone to do some guerrilla marketing. “I was so shy, I hated it,” Gardner says, “but I knew I had to get the word out.” She did, and they shipped over 150 of the now-patented ChapRs (all profits from these sales went towards giving away free ChapRs to teams in need).

From this initial project, Chap Research, an after-school program that gives students opportunities to learn soft skills including teamwork, management, and public speaking, was born. Three years on, Chap Research students have completed 15 different projects and three research papers. From sales to soldering to creating a Web management platform and media campaigns, the students in the program drive every step of the process of taking a concept “from whiteboard to reality.”