

Success Story

New Teaching Methods Create Order from Chaos



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Tommy Sumrall
Forrest County Agricultural
High School teacher

Tommy Sumrall’s physics lab is hectic and noisy. In one area of the classroom, teams of students use hand-held computers to collect data from experiments on light reflection and refraction. Meanwhile, Sumrall and several students gather around laptops and engage in an animated discussion about an online optics simulation that allows them to use virtual mirrors and lenses to model the behavior of light.

Sumrall, the physics teacher at Forrest County Agricultural High School (FCAHS) in Brooklyn, Mississippi, is unfazed by the seemingly chaotic classroom. “To me, it’s a wonderful noise because it shows that the students are interested in learning,” he says. “Students are becoming immune to traditional teaching methods. They need something that keeps their attention. We can use technology to create relevant, hands-on learning experiences that stimulate their curiosity and interest.”

FCAHS, which serves approximately 560 students, offers new courses that support the development of science, technology, engineering, and math (STEM) skills. Like many teachers at FCAHS, Sumrall has moved from lecture-based teaching to a 21st century pedagogy that emphasizes more student-centric methods. This allows him to engage students with different learning styles and levels of interest.

“On their own, new technologies are nothing more than expensive toys,” says Sumrall. “But when combined with 21st century pedagogy and curricula, new technologies can help students learn subjects and concepts that are difficult to teach using traditional methods.”

Creating Relevant Learning Experiences

As part of the Cisco® 21st Century Schools Initiative (21S), Sumrall was selected to receive a US\$50,000 equipment grant to revolutionize his traditional physics classroom; enabling students to complete experiments using sophisticated devices. Sumrall is one of the leaders in the school’s effort to create a more challenging and collaborative learning environment through the strategic use of technology.

“Maintaining interest can be especially challenging in a course like physics,” Sumrall explains. “There is a lot of math involved, so I try to keep it on a conceptual level and use hands-on activities that the students can relate to more.”

Sumrall’s physics class is equipped with disposal hand-held data collection devices, probeware for digitally measuring physical quantities, special-purpose lab devices, an interactive whiteboard, laptops, and Internet resources, which are all connected through an IP network. He describes how technology enhances learning in his class by providing more analytic, problem-based experiences. “First, I introduce a topic in class, review the terminology, and ask the students to think about the assignment.

Then, in the lab, we use a hand-held device that allows them to plug in a variety of measurement sensors. Lab manuals guide the students through the process, making them investigate and answer their own questions along the way.”

The hand-held devices, which are connected to laptops, allow students to automatically graph data. Sumrall says this allows them to spend more time analyzing data instead of manually collecting and plotting it. “When we studied mechanics, the sensors allowed us to accurately and quickly measure motion and force. The students wheeled lab carts around, taking measurements such as velocities or accelerations. Timing is difficult to measure, especially with a stopwatch. But this equipment allows you to measure time to the nearest millisecond.”

Sumrall points out that this is a relevant learning experience, because it reflects how the task would be accomplished in the real world. “We used to spend most of our time taking measurements and graphing them. There are benefits to learning and practicing this, but not 25 times, especially when you don’t know whether the data is correct. There is a huge advantage to instantly having a graph that represents what you’re doing. If something goes wrong, you can simply do it again. This is how real scientists do their work and it is much more rewarding for the students.”

Adapting to 21st Century Pedagogy

Students sometimes resist learner-focused pedagogy because it is such a departure from their previous experiences. “They have never been asked to learn this way before,” notes Sumrall. For example, Sumrall gave his physics class its first guided inquiry exercise—a question about motion and acceleration. “They were interested, but they didn’t know how to approach it,” he explains. He guided his students through the process step by step, and then gave them another inquiry to try on their own. “At first, they were out of their element,” he says. “But as the year progressed, the students’ ability to use inquiry methods and higher-order thinking skills essential to scientific work improved significantly.”

Transitioning to a 21st century pedagogy requires teachers to adapt as well. They must develop new ways of curriculum planning, classroom teaching, and student management. “We’re used to answering our students’ questions. We have to learn not to answer, but instead to act as a facilitator so that students can answer their own questions,” Sumrall explains.

Reaching More Students

Ultimately, Sumrall says that the results are well worth the time and effort expended to transition from traditional teaching methods to 21st century pedagogy. “The students give me very positive feedback on the labs. Their interest has increased dramatically since we brought in new technology and more collaborative ways of learning,” he points out. “There’s a lot less frustration and a lot more interest because the technology allows them to focus on problem-solving and analysis. The independent learners really thrive and the less-motivated students often find that participating in hands-on activities is a lot more interesting than listening to lectures and memorizing vocabulary.”

“I had a student who had a zero homework average because he didn’t do his homework—he didn’t even try. But he loved labs, because he was good at using the technology to set up the experiments. He was proud of his proficiency in the lab, and he was able to learn the concepts from doing the lab work. And he actually did pass the class!” Sumrall concludes. “This is a student whom I wouldn’t have been able to reach using traditional methods.”

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Cisco’s Global Education group is actively engaged in the work of transforming education systems to be relevant to meet the needs of 21st century learners, educators, and organizations. This effort requires a shift in the way teachers teach, leaders lead, and students learn.