Lisa Plummer

Learning Taken to a New Dimension

As 3D technology wins over students, vendors are finding ways to make it more accessible, and teachers are searching for more intriguing ways to use it.

WHILE 3D TECHNOLOGY'S first recorded use dates back to the 1800s, its popularity first surged in the 1950s with the rise of 3D films that paired the now classic red and cyan filter system with cardboard specs. Today, a state-of-the-art update to the technology from Texas Instruments called Digital Light Processing (DLP) uses millions of microscopic mirrors to reflect light and create the three-dimensional effects via a single lens projector. In movie theaters and television production, it has become—if not yet ubiquitous—increasingly prolific. In education, its use has grown over the past two years.

Since *T.H.E. Journal* last wrote about 3D technology in K-12 education a little more than a year ago, the number of brand manufacturers now using DLP chips to create affordable 3D classroom projectors has doubled to 18. Consequently, more and more schools are equipping their classrooms with this technology.

Complete 3D implementation can be expensive. In fact, so far many of schools that have pioneered its use have done so in partnership with vendors.

Nevertheless, some of them have found intriguing ways to help their students learn and overcome obstacles to implementation. When other schools still waiting to make the transformation are ready, they'll have the experience of several trailblazing schools and districts to call upon.

With 28,000 K-12 students and 54 schools, the **Boulder Valley School District (CO)** was the first, and is still the largest, district to implement 3D, experimenting with the technology in four of its schools, including an elementary, a middle, three high school classrooms and a day school and treatment center for kids with special needs.

According to Kristin Donley, a science teacher and STEM instructor at Boulder Valley's Monarch High School, the implementation of 3D in her classroom has allowed her students to become much more adept at understanding abstract information.

"I teach mostly biology and chemistry and a lot of that information is hard to visualize, so the 3D really helped them see in much more detail what I was trying to teach them," says Donley. "As they would do an essay question about molecular processes, for example, they were able to recall details much better from a 3D representation versus a 2D and were able to put those details in their essays."

Donley notes that students also were more likely to notice details and enjoy correcting mistakes they found: During a 3D video on meiosis cell division they realized spindle fibers were attached at the wrong points, an unintentional error.

"The kids were able to identify that, to a higher level of understanding based on that video," Donley says. "Then they started asking much deeper questions about the content much quicker."

According to Len Scrogan, a former Boulder Valley director of instructional technology and library media and consultant with Texas Instruments, although stereoscopic 3D is indeed compelling for student learning, its power goes beyond just the "wow" factor of the visualization.

"What happens with 3D in the classroom is the closer you bring it to the learner, the more they stop, totally focus, and want to understand a whole new world they haven't seen," Scrogan says. "We see it in all our schools and in our most difficult classrooms, including our lockdown schools. I call it the 'ladybug effect.' The closest thing I can think of is when you were a child and you had a little ladybug in the palm of your hand. You spent the time to investigate and to care."

For those students who are primarily visual learners, seeing a concept come to life in 3D and viewing it from different perspectives can promote a new understanding of material, says Jodi Szuter, sales manager of XpanD, a manufacturer of active shutter 3D glasses, which use technology that helps create a realistic illusion of depth perception for the wearer.

"Just about every subject can be taught more effectively in 3D, but in particular subjects like geometry and biology, where you're dealing with 3D shapes and objects," Szuter says.

Mobile Alternatives

Ocoee Middle School in metropolitan Orlando, FL, is an official State of Florida Demonstration School for Technology that has been using 3D in its science and math classes for the last 18 months. Ocoee Principal Sharyn Gabriel says teachers have noted an increased interest in learning.

"We have definitely seen significant anecdotal evidence about engagement," Gabriel says. "I can't afford to put frogs in their hands or robots or DNA strands, but this does that without that cost. My teachers love it and their biggest concern is, 'Give us more!'"

To make sure the technology was worth the investment, the school participated in a pilot program with 3D AVRover, which provides a mobile 3D solution. Equipped with all the components needed to show 3D, including a projector, computer, software, glasses, educational content, and an integrated audio system, Ocoee's math and science teachers have been able to share four units that can be rolled from classroom to classroom.

Dipping a toe in the water with one or two mobile units is one way schools can go forward with 3D, says Doug Smith, president of AVRover.

"A large school district that has 30 schools might start by buying one of our systems and bringing it in with all the content and viewing the content to see how appropriate it is to the classroom," Smith says. "They might match it to their standards or how they're trying to teach, see whether it fits into their lesson plans, and, if it does, they would implement it."

Gabriel says 3D can also help schools cut costs without having to eliminate valuable learning experiences. Instead of dissecting live frogs in a biology class, for example, students can experience virtual dissection via an interactive 3D representation. Kids can pull the virtual frog apart, explore its anatomy, put it back together, and gain a deep understanding of the anatomy—all the while saving the school the expense of dissection frogs (not to mention countless amphibian lives).

Located in Dallas, the **Shelton School** is the largest private school in the US for children with learning differences, including dyslexia, attention deficit hyperactivity disorder, and speech and language disorders. Like Ocoee, Shelton has used 3D for approximately 18 months, also as part of a pilot program with a vendor (in this case, Texas Instruments, which supplied the school with 3D projectors, XpanD glasses, and educational content).

Lauren Sanders, a math teacher at Shelton, says 3D has helped her students stay calm, focused, and engaged during her lessons.

"The bell will ring and they won't want to leave class," Sanders says. "Our kids are very visual and kinesthetic, versus auditory, learners. 3D has really been helpful because (they) need to see how things turn and move. Any time you can get kids engaged in learning and actually learn something, it's a plus."

Jaime Beringer, Texas Instruments customer marketing manager, says, "We've had a lot of the teachers tell us they have a better ability to control their classroom when they're teaching in 3D and that the students really get engaged."

Although Sanders believes 3D is a valuable and important educational tool, she said the biggest limitation for her school has been the lack of appropriate content.

"For us to go to the next level, we're going to have to make sure content is available," says Sanders. "The hardware is there but now it's going to be a software issue on what the content providers can create for the schools. I don't see (3D) actually replacing the teacher in the classroom, but I could see maybe 30 to 40 percent of teaching being done using 3D if the content is all there."

The Future Landscape of 3D

Although still in its infancy in education, 3D appears to be establishing its place as an emerging tool that not only complements the educational process but could drive a new way of learning that is more engaging, immersive, and, ultimately, more successful for students.

According to Chris Chinnock, founder and president of Insight Media, a consulting company that runs seminars for educators about 3D, "There's a lot of experimentation and knowledge that has to be learned, but even some of the early experiments are showing benefits." the

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