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High-Tech School Bus Teaches Students on the Road

Students at a rural Arkansas school district ride a wired bus that can play educational TV programs and is capable of student-teacher video conferencing.

December 14, 2010 • Lauren Katims Nadeau



Last year, kindergarten through high school students in the rural Hector, Ark., School District barely had the technology resources that keep kids interested in math and science. This year, they potentially have the most advanced resources in the country — before they step into the classroom.

One school bus in Arkansas' Pope County has been transformed into a mobile classroom equipped with computer screens mounted to the ceiling, earphone jacks, wireless Internet access and a separate scanning device to record bus activity.

The five 19-inch customized computer screens stream math and science content from PBS, NASA, the Discovery Channel, CBS News and the Smithsonian Institution for students to watch on their hour-long rides to and from school. The screens also include video-conferencing capabilities.

“Theoretically a teacher could work with a group of students on the way home. ... It has a lot of versatility,” said Dr. Julie Hudson, co-founder and program director of the Aspirnaut program, which was created in 2007 to improve achievement and raise interest in science, technology, engineering and math (STEM) for students from rural areas in Arkansas and Maine.

STEM Focus

The technology, believed by its developers to be the first of its kind, is one part of a much larger initiative to implement different activities — such as video conferencing and discussions between middle school students and college professors, virtual science labs and research internships — to encourage students' interest in the field.

“If the forecast is anywhere close to accurate that half the jobs in the next 10 to 12 years will require at least a year past high school in STEM training of some sort, we're not getting there,” said Hudson. “Rural students are disadvantaged in many ways, not the least of which is geographic.”

The program is currently working with seven school districts, servicing 200 students in the two states, and gets funding from multiple sources, including state governments, school districts, Vanderbilt University and private funding.

The Hector School District bus began officially running in October, but the Hudsons — Julie’s husband is a Vanderbilt professor — worked with the school district and a bus company to determine how to rewire the bus to make it Internet ready.

The screens are mounted in a custom-made metal frame that protects against shocks and vibrations, are built to withstand extreme conditions, and are scratch and dust resistant.

A media server stores all the videos and is accessed remotely by Aspirnaut staff who upload the content. The computers access the server through the Hector School District Wi-Fi network on a daily basis. Students, grouped by age and grade in five seating locations on the bus, listen to their specific curriculum by plugging in their headphones into the jack below their seats.

The content in each zone is correlated to what they’re doing in the classroom, said Hudson. Student use is not mandatory, but is highly encouraged by the school district.

Various student surveys throughout the school year will monitor the students’ motivation and interest, and content will be adjusted accordingly, said Hudson, who wants to wait at least a year before pitching the idea to other counties.

“This is the feasibility stage, and so far so good. Now we want to see — does it have impact, is it worth recommending that other school districts adopt this?” she asked.

The bus is also equipped with a scanner that detects when a student with a card enters and exits the bus. The card shows a number, instead of the student’s name, and can detect GPS coordinates. When the bus arrives at the school each morning the information is downloaded onto the school’s computer system for attendance and ridership purposes.

“It helps us track who gets on and exactly how long they’re on the bus,” said Hudson. The scanner helped the Aspirnaut staff coordinate when to stop and start the computer programs.

The project cost about \$20,000 and was funded by various sources. Hudson said the price to wire a bus has gone down 70 percent in the last three years.