

Fremont County School Districts, Wyoming - *First in the Nation to Deploy Cisco Content Networking Solution for Grade-School Curriculum*



When Wyoming legislators mandated a foreign language program for every kindergarten through high school student in the state, the central Fremont County School District was challenged with finding dozens of Spanish teachers for classrooms by late 2000. A statewide shortage of language teachers, coupled with funding cutbacks for new teaching positions, inspired school administrators instead to forge a creative partnership. The district teamed

with Cisco Systems, and the Board of Cooperative Education Services (BOCES) to deploy the first content delivery network to provide students with direct access-in their classrooms-to language education. The solution includes a centrally located Cisco Content Distribution Manager and Cisco Content Engines Series 500 in each school, for broadband streaming of audio and video instruction to students in the 9,000-square-mile service area.

Content Distribution Key Hurdle in E-Learning

E-learning has been hindered in recent years by the complexity, network congestion, and expense of distributing video clips, animation, audio tracks, and interactive applications over public or private networks. Cisco has created a comprehensive, end-to-end solution for e-learning called the Cisco Global Learning Network, based on Cisco AVVID (Architecture for Voice, Video and Integrated Data). A distribution architecture for rich media content delivery is a key

component of this e-learning environment.

Responding to the Initiative

After receiving the news of the foreign language mandate, the Fremont County School District moved quickly. The district's regional BOCES team learned that Central Wyoming College had recently purchased Cisco content networking equipment.

"We became convinced, through talking to one of the technical people at the college and to sales representatives from Cisco, that we could not only use a content delivery network to teach Spanish to all grade levels but that it could be used to augment classroom lessons in math, science, and other subjects," said Sandy Barton, director of the Fremont County BOCES.

BOCES provides technical services, education services, and teacher training for schools in eight districts, on the Wind River Indian Reservation, and for Central Wyoming College. Within two months, the district asked Cisco to propose a solution, and content delivery network installation began

Taking Advantage of Off-Peak Hours

Twenty Cisco Content Engines 500 Series were installed with the help of Casper, Wyoming-based Cisco reseller Information Systems Consulting in Fremont County public schools and Bureau of Indian Affairs schools. Cisco Content Engines transparently cache content from central content servers and make it available to each classroom upon request.

District schools are connected to the state-run Wyoming Equality Network through various types of leased lines, with speeds ranging from 56 Kbps to 1.5 Mbps via Frame Relay. Cisco 1600 Series routers connect the Cisco Content Engines to the Wyoming Equality Network, where content is retrieved from a Cisco Content Distribution Manager, housed at Central Wyoming College.

Teachers in each school anticipate their needs ahead of time and, through a user-friendly Web site, request content for their classes several days ahead. The Content Distribution Manager determines how much bandwidth to allocate for the transmission and creates a download session for off-peak hours, either at night or early in the morning. The content is streamed either all at once or over several days during different times to the Cisco Content Engine from the requesting school. Once there, teachers within the school can access the content on their own Ethernet-based local area network for replay on large-screen computers, PC screen projectors or video monitors.

"We believe this content delivery network solution will enable us to avoid paying for much more expensive, wide area network connections for the schools," says Barton. Barton worked closely in implementing the network infrastructure with Bruce Thoren, Technology Director at two of the Fremont County school districts.

The Cisco Content Distribution Manager provides transparent HTTP redirection of user requests to the appropriate Cisco Content Engine. When used by a service provider, it can also keep track of all traffic going back and forth across the network for accounting and billing.

"To ensure copyright protection for content bought from third parties, we decided to partition access into separate channels for each school," says Tina Clifford, special projects coordinator for BOCES. Clifford is responsible for training, and for putting content on the Cisco Content Distribution Manager, which handles queries and streaming responses for all 20 schools.

Content being delivered through the Cisco Content Delivery Network includes digitized VCR videotape content, digitized audio tracks, and presentations in Microsoft PowerPoint. BOCES plans to utilize locally developed content, content purchased from vendors such as the Public Broadcasting System, and content from the STAR school curriculum database, comprised of curriculum developed by teachers across the United States.

Spanish and Beyond

The initial rollout of Spanish language classes, directed toward kindergarten to third-grade students, is receiving enthusiastic reports. Teachers don't have to know a word of Spanish to present the course, which includes songs sung in Spanish and English, Spanish versions of games such as "Simon Says," and hand puppets spouting Spanish phrases. Workbooks accompany each class, and the teachers in the video programs are shown writing in the same workbook pages given to the students.



While teaching Spanish effectively to every student in the county was the original impetus for the content delivery network project, the school districts are also planning to use the network to support teachers in additional subject areas that would benefit from audio, video, and other electronic content. Another anticipated use is for professional development courses for teachers and administrators.

"For math or science, sometimes it's much more effective to show something such as a process through a video or animation," says Clifford. "And for students who are more visual learners to begin with, it helps them master complex concepts."

BOCES hosted a summer Cyber Camp at Central Wyoming College to introduce the content distribution network system to more than 172 teachers.

"Initially, we're trying to make the system as easy as possible for teachers to use," says Barton. "We're doing all of the content digitization and loading it into the Cisco Content Distribution Manager. But eventually, we envision teachers developing and uploading content themselves."

After evaluating the effectiveness of the system following the 2001-2002 school year, the BOCES team hopes to expand the program beyond kindergarten to third grade so that middle- and high school students can also benefit from this type of instruction.

Once the 7,500 students in Fremont County have been served, BOCES anticipates replicating the content delivery network to counties and school districts throughout Wyoming. Additionally, a federal Twenty-First Century grant to extend the use of the courses and content on the content delivery network to after-school programs was recently received by the county.

"Teachers are really excited about this, even before the system has been in widespread use," says Barton. "It's part of a state-wide technology plan, and the school districts here are very interested in the electronic classroom, in freeing teachers to develop courses that can be broadcast to schools throughout a district and throughout the county."



According to Barton, the average annual salary of a full-time language instructor is \$33,000. The districts would have needed at least 14 such teachers for all of the kindergarten through third-grade classes in Fremont County. "That comes to \$462,000 for teacher salaries, not including benefit packages, curriculum workbooks, materials, or the cost of expanding some of the facilities," says Barton, who is confident that the Cisco Content Delivery Network project will prove to be a substantial cost saver in addition to being an effective instructional medium.



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