



Innovation in Tough Times: U.S. Schools Find New Ways To Drive Efficiencies through Technology



Cisco Symposium Participants at a Glance

Anoka-Hennepin Public Schools, MN

- 40,000 students
- District serves 2 counties, 13 communities
- Annual budget: \$500 million
- Recently closed 8 schools, moved 3,100 students and 500 staff members

Campbell Union High School District, CA

- 7,700 HS students
- Approximately 14,000 students in five partner elementary districts

Memphis City Schools, TN

- 105,000 students
- Annual technology spend: \$20 million

Milpitas School District, CA

- 10,000 students
- Annual budget: \$76 million

Mooresville Graded School District, NC

- 5,500 students in 8 schools
- Annual budget: \$45 million

The economic contraction that began in 2007 continues to have far-reaching effects, with education being one of the country's hardest hit sectors. According to the Center on Budget and Policy Priorities, 34 states and the District of Columbia already have made significant reductions in their budgets for K-12 education, with another 13 pondering still deeper cuts during the 2011-2012 fiscal year. In total, 85 percent of the country's 14,000 school districts have been forced to slash their operating expenses. At the same time, in a number of states legislation is being considered that would increase class sizes.

Almost without exception, public schools are faced with the reality of having to do more than ever: they must serve larger student populations, deliver a differentiated curriculum, address the needs of students with learning differences, comply with increasingly complex assessment and reporting metrics and mandates, and much, much more. And, these requirements must be fulfilled with fewer resources than ever.

How can cash-strapped school districts continue to scale limited resources (such as people, money and qualified subject matter experts), maintain optimum service levels and achieve positive student outcomes? In many cases, maximizing districts' technology expenditures has been key to their success: by implementing innovative, technology based initiatives matched to specific academic or administrative goals, and changing the mix of their investments, districts have been able to reduce costs and deliver new high quality content and services.

In May of 2011, Cisco brought together its fourth symposium comprised of educational leaders from across the U.S. (see sidebar) for a three-hour discussion about the challenges they are facing in the current economic environment. The purpose: to develop a conversation about ways in which all U.S. school districts can employ technology to reduce costs, generate new revenues, collaborate across districts, and create higher efficiencies and more successful outcomes in the classroom, even as budgets are increasingly constrained.

All administrators and educators shared their unique challenges and even more unique solutions. Clearly, our public school system continues to face extreme difficulties. Mindful of these issues, in this paper Cisco presents the best practices of several of the country's most progressive educational thought-leaders.

Cisco Symposium Participants at a Glance

Paradise Valley Unified School District, AZ

- 33,500 students

Rockwood Schools, MO

- 22,500 students in 9 municipalities
- Annual budget: \$205 million
- Annual technology spend: \$10 million

Round Rock, TX

- 40,000 students
- Annual budget: \$336 million

St. Paul Public Schools, MN

- 38,000 students

Walled Lake Consolidated School District, MI

- 15,485 students
- Annual budget: \$152 million

Watauga County Schools, NC

- 4,600 students in 9 schools
- Annual budget: \$39 million

Hardware: It's a Virtual World

Exclusive of salaries, hardware purchases typically account for the biggest portion of a district's operating budget. Computers, monitors, printers, projectors and other devices can quickly and easily consume precious dollars. But a number of districts have discovered workarounds that make sound business sense.

Virtualization - The Rockwood School District (RSD) has made significant inroads in virtualizing its servers. Through virtualization RSD has reduced its number of physical servers from 85 to 20, saving over \$200,000 annually in support costs. Rockwood also provides "sky drives" (cloud-based storage) for each teacher, yielding 25GB of storage space each, versus just 1GB for each on local servers. In the Walled Lake Consolidated School District, virtualization has shrunk the number of servers needed from 39 to just 15 systems.

The popularity of virtualization extends to the desktop as well: Since 2009 the Campbell Union High School District (CUHSD) has virtualized nearly half of its 3,000 workstations, along with the applications and services used district-wide (in actuality the district has not purchased a new desktop in the past five years). This has resulted in a dramatic 67 percent savings, while empowering users to access a host of new applications through their web browsers. Often, as many as 1,000 students and employees log onto their applications during the evening hours.



Campbell also has repurposed its existing hardware, effectively transforming the machines from "fat" (running all applications at the desktop) to "thin" (accessing apps and services from a server) clients. This action alone has saved the district \$1.5 million in the past two years, and helped reduce its per-desktop expense from \$6K to \$1K. "By implementing these measures our ROI has been huge," noted Charlie Kanavel, director of information technology for CUHSD.

Standardization - Here districts have discovered that there is no "right" answer. The Rockwood district made the choice to purchase and support a mix of computer models (desktops, laptops and netbooks) from a single manufacturer. This has enabled the district to provide targeted computing solutions, and yielded a savings of nearly \$1 million in the past two years. But in the Milpitas Union School District, where only one technician is allotted for every 700 computers, a single, standardized computer is in use district-wide. The Memphis City School District has selected three standard models; a choice they report has reduced maintenance costs appreciably.

The Anoka-Hennepin School District is evaluating whether to allow students to bring their own mobile devices/laptops to school, and then virtualizing the desktops. At present the district's IT team is developing a profile of the device that will be needed in the next five years, and researching funding sources. In the interim, the district has launched a pilot program in which mobile devices (such as iPads) are being used in Special Education classes, to great success. "One formerly mute student spoke for the first time after using an iPad," said Anoka-Hennepin CIO Patrick Plant. "Also, the use of certain applications, like Pro Volt, can reduce the cost of the devices by thousands of dollars, while making them more efficient."

In the Walled Lake district, the school board recently approved a policy enabling students to bring their mobile device of choice to class, including cell phones and iPads. This enables Walled Lake teachers to send quiz questions to Poll Everywhere.com, and then students use their devices to reply via text messages.

The Campbell district is giving serious thought to replacing all textbooks with iPads. During its last purchase cycle, textbooks cost \$8 million.

“If we virtualized all of our textbooks and bought every student an iPad, we’d still save millions. Plus, our kids would have a device that’s very compelling to them. We need to think about our spending in a different way.”

Charlie Kanavel CIO, Campbell Unified

Netbooks vs. laptops – As computers grow steadily smaller and more powerful – and in keeping with students’ growing preferences for using cell phones and similar handheld devices – several districts (even a few that have implemented 1:1 programs) are migrating from laptops to netbooks. Rockwood Schools reported that they have saved \$400 in the per-unit cost by purchasing netbooks, and at Walled Lake (where a similar migration is underway), district administrators are enjoying both cost savings and positive feedback from students.

“We began the shift to netbooks about three years ago,” said Mark Hess, executive director of instruction, technology and assessment at Walled Lake. “Our kids are used to mobile devices, so they really like them. Plus, we’ve realized some savings by buying netbooks versus full-sized laptops.” In the Milpitas school district, analysis is underway to shift from laptops, at \$900 each, to \$300 netbooks, and to move to cloud-based computing. Desktops also may be virtualized in Milpitas in the next few years if budgets allow.

Consolidation – The proliferation of multifunction devices has had dual benefits. Not only can school districts replace several peripherals (printers, copiers and scanners) with a single system, freeing up real estate in their buildings, they are saving money in support and energy costs. “Printing was a huge drain for us,” noted Rockwood Superintendent Dr. Bruce Borchers. “We’ve had a big push to use multifunction devices, and we moved away from InkJet printers years ago.” Walled Lake has completely eliminated desktop printers in favor of multifunction machines; a move emulated by the Anoka-Hennepin district as well.

The Milpitas district has taken this concept a step further, incorporating the use of digital signatures. “Our teachers no longer have to print out attendance logs and sign them, for example,” said Scott Keller, director of technology at Milpitas USD. “This will really save on printer, paper and toner costs.”

Additional costs savings can be enjoyed by identifying new technologies that can meet every site’s needs, as the Milpitas district discovered when it re-evaluated its choice of interactive white boards. “A few schools plan to try out eBeams next year, and we’ll look at other, cheaper options as technologies improve,” Keller said.

1:1 Computing – In the Moorerville Graded School District (MGSD), where a “digital conversion” has made Apple MacBooks available to all students in grades 4-12, administrators are quick to point out that the 1:1 initiative has been responsible for dramatic costs savings. “Going digital has saved us a ton of money, especially in our printing costs,” confirmed Dr. Scott Smith, MGSD’s chief information officer. “Everything we do, from administrative tasks, all the way to what our students do in the classroom, is all done digitally.” Smith added that since MGSD has not purchased a textbook in the past three years (save for AP classes, which must still conform to state standards, almost all content is delivered digitally), many of those funds have been reallocated for digital content and other projects.

Walled Lake also launched a 1:1 program in 1999. Each year since then, approximately 500 students have had 24/7 computer access. Parents purchase the laptops through a partnership with a local reseller; if parents do not opt into the program, students have access to laptops via carts during school hours.

“Reverse Auctions” – The Memphis City School District has held “reverse auctions” on its older computers, in which they sold the systems to a buyer at a reduced rate. This has saved the district \$1.5 million annually.

Applications: Need Drives Innovation

In the area of software deployment, school districts have demonstrated profound creativity. Despite greatly reduced IT resources, districts have devised a seemingly infinite number of innovative applications, leveraging web-based delivery, cloud-based computing, virtualization and other leading edge technologies.

Portals – In perhaps no other area is there as much movement by U.S. districts than in portal creation. Portals are being deployed by almost every school district, for use by faculty,



students, families, employees and every other conceivable user, no matter what the desired application, process or service. These web-based “workspaces” save time, consolidate and deliver functionality to the desktop, greatly reduce (and in many cases eliminate) printing costs, and also shrink support expenses.

The Rockwood School District hosts a portal that supports class registration for students, posts report card and homework assignment information for parents, delivers HR and payroll info for employees, and much more. In the Anoka-Hennepin district, all technology resources have been combined into a single portal, enabling easy access by teachers. “We’re moving to much more of a ‘self-service’ strategy,” explained Plant. “Our portal even has videos users can watch, so they can answer their own questions.”

A portal launched by the Walled Lake district supports its shift to a paperless environment. No report cards or program reports are mailed; instead, parents log onto the portal to access the information. The portal also enables parents to populate students’ lunch accounts, pay registrations fees, parking fees, etc. “Everything is automated as much as possible,” Hess said. Additionally, the portal enables district employees to access their paystubs, set withholdings, and more. Teachers can share best practices via the portal as well. “This 24/7 self-service model reduces our costs, and increases our efficiencies,” said Hess.

Learning Management Systems – Almost all districts surveyed have deployed a learning management system (LMS), whether proprietary, packaged, or an open source tool such as Moodle. All report that being able to automate the tracking, reporting, administration, and documentation of students’ progress has proved highly beneficial, from both a cost-savings and efficiency standpoint.

“Our LMS enabled the creation of common progress reports and grading; it’s online and standards-based, so our district easily migrated the system from the elementary school through the middle schools and into the high schools,” said St. Paul Public School District CIO Ivar Nelson. “Also, our Oracle Business Intelligence application is linked with our student management system, and is rolled into our HR system. This has allowed us to provide an overall picture of our district, and optimize our efficiencies.”

The St. Paul district also utilizes a proprietary hybrid GIS system, which allows for capacity planning, the movement of students due to school closures, etc. “Despite closing eight schools last year, this application enabled us to earn a high customer satisfaction rating,” Nelson said.

Energy Management Systems – With utility costs consuming a large portion of districts’ budgets, several have implemented applications that provide dashboard views of energy consumption, and suggest cost-saving measures that may be taken. The Rockwood district has deployed a power management application that ensures that computers not in use are completely shut down. “We could save as much as \$150,000 to \$200,000 per year on our energy bill alone,” Borchers reported.

In the Memphis district, administrators encourage an old-fashioned method of energy savings: “We’re trying to utilize what we have now, versus buying something new, and we tell everyone to switch off any systems that are not in use,” Memphis City Schools CIO Richard Valerga said.

Walled Lake implemented an energy management system in 2005, and funds a part-time energy manager who helps monitor and educate staff-members about energy usage.

Packaged Apps – As always, school districts are deploying a full range of time- and cost-saving packaged applications, including Google Apps, which have been piloted by Walled Lake teachers.

WebEx/TelePresence – Cisco applications and technologies have gained considerable traction in the past several years, enabling districts to scale personnel and programs across a large geographical area. The use of WebEx offers potential in delivering distance learning and professional development, while TelePresence expands the walls of the classroom to create a global teaching and learning community.



The Campbell School District has had an emphasis on the online recovery of credits, deploying WebEx to achieve very positive outcomes. “It’s all possible now via WebEx broadcast of classes,” Kanavel said. “They can be paired very effectively with online, self-paced learning. We had one Adult Ed student who completed an entire Economics class in four days in this way.”

Paradise Valley (PV) Unified School District teachers utilize a mix of WebEx and TelePresence in numerous ways. In one instance, the district lacked enough students at five schools to run a Calculus III class. But through TelePresence, they were able to hire one teacher and reach out to all five schools with high-quality, real-time instruction. The district has hosted multiple TelePresence sessions with Duke University, connecting 9th-graders with science, technology, engineering and math (STEM) students at the university. PV also has interfaced its TelePresence unit with Polycom teleconferencing systems, enabling teachers to attain advanced degrees without traveling across town to the university. Additionally, the Arizona district has integrated TelePresence to deliver multi-client sessions with universities and communities as far away as Harvard and the University of Wisconsin-Madison. And, K-12 students are not only connecting to university faculty and students, without boundaries, but to other K-12 students and teachers, through the immersive “personal experience” provided by TelePresence.

“TelePresence is not used for lectures, but for the introduction of concepts and remediation,” explained Jeff Billings, PV chief information officer. “Our mission is to cultivate world-class thinkers; to me, the first step is connecting to world-class thinkers. TelePresence has enabled us to bring in international experts in a variety of areas, and in turn that will allow us to offer new courses this fall that will generate revenue for us.”

In the next year three school districts in Minnesota will add TelePresence systems, enabling them to share academic resources. The systems will be used for language studies across the three districts. “Our three-year goal is to offer an ‘immersive experience,’” said Nelson. TelePresence also will be used for Special Education classes and remediation in the Minnesota districts.

Infrastructure: Efficiency at the Backbone

With the increasing use of rich multimedia content in education, schools require a networking infrastructure that is robust, reliable and secure, often a big-ticket expense. Telecommunications systems also require costly installation, troubleshooting and support. Many districts have retooled their networking and telecom systems, leveraging fiber and dark-fiber, voice-over IP (VoIP), Skype and other technologies to improve their bottom lines.

To ensure the most cost-effective support for its computing systems, the Anoka-Hennepin district installed a 92-mile fiber optic network, which was paid for by a Federal grant. “This gives us a lot of capacity to extend learning beyond the classroom,” Plant noted. Future plans may include the installation of a dark-fiber network, which would increase the district’s capacity to connect to families and businesses in the area.

In the St. Paul district all buildings are now connected via fiber optics, while the Walled Lake district has been wireless since 2006. The Campbell district is entirely WiFi, enabling simultaneous Internet access by all 1,000 students. In Wautaga, the district provides fee waivers for students whose families can’t afford online access at home, or lack a data plan.

The Paradise Valley district has connected to the National LambdaRail, the nation’s 12,000 mile, ultra high-speed research computer network. “More K-12 schools are using it now,” Billings observed. “We’re on a mission to connect a community of world-class thinkers; this network allows seamless international connections.”

On the telecommunications side, the St. Paul district recently shifted to a VoIP system; a move emulated by the Rockwood and Milpitas districts. "Voice over IP has saved us hundreds of thousands of dollars in the last four years," Keller reported.

The Mooresville district deployed Cisco's Unified Communications System in 2010, and anticipates financial benefits in the very near future. "Our ROI will be less than three years for this state of the art telecommunications system," Smith said. Cisco's VoIP system has saved the Rockwood district what Borchers estimates to be approximately \$100,000 per year in operating costs.

Professional Development: Supporting Continuous Learners

No matter how innovative or economical a technology initiative may be, it is completely devoid of value without the thorough buy-in and understanding of its intended users. Savvy school districts, therefore, integrate ongoing professional development (PD) hours into their calendars. During these sessions teachers have the freedom to experiment with and learn the capabilities of new educational technologies, and share best practices with each other.

The Round Rock district recently migrated its teacher training from online sessions to Moodle, enabling instructors to collaborate, share lesson plans, assessment and planning. "Our teachers really like the user-friendliness of this model," said Dr. Jesus Chavez, superintendent. Some training is still delivered online; this assists in tracking the modules that teachers have completed. Also, Round Rock is collaborating with neighboring districts in presenting PD, which has helped the district reduce its costs. Administrators are exploring the possibility of adding still more training sessions as a potential revenue stream as well.

This shared-services concept is employed by other districts, including Walled Lake and Campbell. "We've shared professional development with other districts, and hosted tours of our classrooms," Kanavel said. "And when we hear about something innovative being done, we go visit. This helps us save a lot of money when we're implementing something new."

MGSD has made a significant commitment to its PD effort, scheduling 10 early-release days each school year that enable teachers to acquire new technology skills. The district also hosts a three-day summer institute for its teachers, which boasts nearly 85 percent attendance of all faculty members. This year MGSD will present its second annual summer institute for teachers from other districts. With a \$400 registration fee for each participant, the program represents a welcome revenue stream for Mooresville, and attracts 400 attendees.

The use of tablets and handheld devices is as popular with teachers who are learning new skills as with their students who are connecting with each other. iPads, especially, are rapidly gaining in popularity for PD, as witnessed by their use in the Anoka-Hennepin district. "We find that they're very successful for both Windows and Mac clients," Plant said. Paradise Valley is currently evaluating the use of tablets in its professional development efforts.

In the PD arena, once again Cisco products have proved beneficial. Paradise Valley's Billings noted that the teachers in his district "want more TelePresence access," having found the ability to connect with a infinite community of peers and subject matter experts to be invaluable. The Anoka-Hennepin district uses WebEx in a variety of ways, finding it ideal for smaller training sessions. In Rockwood, teacher training is also delivered via web conferencing tools, supplemented by video systems. "This method saves us a lot in travel costs," said Borchers.

Revenue Generation

Many forward-thinking districts have discovered that a number of opportunities exist to create revenue streams for new services, or to collect fees for those already in use. For example, Indiana (which did not participate in the Cisco symposium) recently announced its first "all-online public high school," which will be available in the fall of 2011. The school will be free to full-time students who reside in the district, but will assess a \$250 fee to part-time students who live outside of Wayne Township. Not only will this model bring in new registration fees, but it is forecast to save the district the costs of utilities, furnishings, supplies and the other ancillary expenses of the traditional teaching and learning environment. At the same time, it is expected that the State's per-pupil funding rate will remain the same.

Round Rock partners with neighboring school districts to provide maintenance of a fleet of transportation vehicles. "It's a way to make everything more efficient by sharing services," Chavez said. "While it doesn't bring in a huge number of dollars, we're still generating revenue from this arrangement." The Round Rock district is also exploring the possibility of generating additional revenue through the launch of an after-school daycare program, and making its print shop available to other districts.

The Paradise Valley district is utilizing TelePresence to enhance its bottom line, having established a Cisco Networking Academy and offering community college courses via Cisco's teleconferencing solution. "In one week we went from never having offered a class in Mandarin Chinese to having 160 kids sign up. We'll also be adding classes in Russian and Arabic," Billings said.

Mix & Match: Collaboration, Creativity Yield Additional Savings

There are a number of other initiatives launched by U.S. school districts that take advantage of local and regional opportunities; many can be replicated successfully in other districts. Creative and eclectic, the list represents the type of out-of-the-box thinking that is typical of school systems that nurture innovation:

- Centralized kitchen/food services under consideration (Campbell)
- Student-run help desk (MGSD): saves time and money, helps students acquire proficiency with various technologies (two students will soon become Apple-certified technicians)
- Policy development governing acceptable use of mobile devices, digital citizenship (Walled Lake, Milpitas)
- Shared services for printing, after school childcare, data center usage: combining maintenance agreements (especially for telecom systems) into a single plan (Round Rock)
- Partnership with neighboring districts to maintain transportation vehicles, share services, reduce costs (Round Rock)
- Statewide procurement partnership (Anoka-Hennepin): this program saved \$1 million during the first 18 months alone
- “Virtual appliances” (Campbell): these would run on the system at a fraction of the regular cost, while delivering 24/7 access to students and teachers via any device
- Replacement of textbooks with eReaders (Campbell): pilot program saw a paralegal scanning and uploading case law into Lexus Nexus for easy access by students. Total cost: \$200.

Summary: Districts Benefit Lessons Learned

If there's a silver lining in the cloud of economic uncertainty that has hovered over the nation in the past several years, it is the fact that organizations have learned to be innovative, vigilant and prudent in their expenditures. Nowhere has this become more a part of the collective DNA than in the educational arena. Faced with a similarly challenging forecast for the near term, school districts will continue to seek the most expedient and cost-effective methodologies for teaching and learning.

In virtually all cases, technology will remain an essential component of districts' cost-reduction and service-enhancement strategies. Having a solid architecture as the foundation of all technology initiatives – to support capacity planning, curriculum mapping and resource scaling – will be an imperative.

Districts that choose to partner with Cisco will find the industry's most comprehensive array of solutions, backed by seasoned educational professionals. In concert with Cisco, districts can harness their networks as a powerful platform for education, and maximize their investments.

However, while technological innovation will continue to be the hallmark of the most progressive districts, one factor will always remain a constant. “The human touch is important,” said Paradise Valley's Billings. “As one of our tenth-graders told us, she likes to know that she ‘can get to know the teacher on the other side of the computer.’”

To learn how your school district can drive innovation and reduce costs through technology, please contact your Cisco Account Manager at education@cisco.com.



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