

Issue Brief

Is Your K-12 Network Ready for Next-Generation Learning?

School districts must tackle their network infrastructure before rolling out new classroom technology tools or risk flunking out. Here's how two K-12 districts tackled network upgrades.

The Challenge with Outdated Networks

Teachers and students at Monterey Peninsula Unified School District (MPUSD) in California wanted to use the laptop carts the district furnished, but the one wireless access point on each cart couldn't handle the traffic of more than a handful of students. The district's antiquated network, a hodgepodge of different technologies that were inconsistent and incompatible, also couldn't handle online video streaming, multimedia websites, and sometimes, even district email.

"Having 30 to 40 laptops online at once was an issue," says Ryan Altemeyer, MPUSD's director of information technology, of the state of the district when he arrived in late 2008. "The technology was outdated, none of the schools had modern equipment and the network was in pretty dismal shape."¹

The Monterey district is far from alone. After spending millions to put next-generation learning tools such as laptops into teachers' hands, districts around the country are finding their make-do networks can't handle the increased data traffic, connections to different devices or the video scaling needs. For teachers, it's like learning they have 1,000 watt light bulbs without enough electricity to power them.

It's a situation that Rodney Mack, executive director of technology for Illinois' Wheaton-Warrenville Community Unit School District (CUSD) 200, knows too well. While his district's network had been upgraded in 2004, it basically just provided connections to the Internet, and poor ones at that. There was no wireless access available when he joined the district in 2010 other than a few systems that provided access for just a couple of computers.

"We were very limited in what we could do with the 13-year-old network," he says. "Teachers and students could really only gain Internet connections and couldn't do much else."² When something broke, it was simply just fixed, he says of his predecessor's approach. There was no overall technology plan.

Unfortunately, many districts find themselves in similar situations. They may have antiquated systems, while others have had to use temporary solutions that became permanent because of a lack of funds. Often, the network is made up of incompatible systems created when technology was added from multiple vendors. Because the network isn't optimized, the potential for using technology in education falls short.



Students from Wheaton-Warrenville CUSD 200 work on a tablet in the classroom.

WHEATON-WARRENVILLE CUSD 200

How Did We Get Here?

School districts have limited budgets and the technology budget isn't always the top priority. This means IT teams often have to make do with what they have or live with small temporary fixes. Wheaton-Warrenville's Mack, for instance, says the IT budget had not increased since 2000, and only represented less than 1 percent of the district's budget.

Small IT departments, many headed up by educators, are devoted to putting out fires and handling emergencies. They have limited time and manpower to plan for future technology needs or keep up with the constant flood of new technologies.

Monterey's Altemeyer started his new position with a mere five-man team to support 10,800 students and 2,000 teachers, and staff in 25 buildings spread out between the cities of Monterey, Seaside and Marina. Wheaton-Warrenville's Mack had

a support team that was nearly triple Altemeyer's, but still found it difficult to do more than put out fires at the 20-school K-12 system serving 13,500 students in Wheaton, Warrenville and parts of Carol Stream, Winfield and West Chicago.

School districts struggling to keep up with new technologies not only find it hard to meet parent and student expectations, but face higher faculty turnover as their best and brightest teachers seek positions where they can use the latest classroom technology. They may face declining enrollment as students flock to schools they perceive offering better technology access, and budget pressures could mount if parents voice their dissatisfaction by voting no on bond issues.

Building a Platform for the Future

Wheaton-Warrenville and Monterey both decided to do something about the status quo. The school districts are in the midst of technology upgrades that not only are bringing the latest software into the classroom but are allowing them to upgrade their antiquated phone systems and bell and communication systems; and roll out wireless access, online student testing and student information systems.

Before each district looked at classroom technologies, they upgraded their networks to ensure they could run and scale with current and future technology needs. "The network really is your platform for the next-generation classroom," says Altemeyer. "It doesn't matter if you bought 1,000 computers and had the best applications in the world if you don't actually have a network [teachers and students] can use."

This Center for Digital Education issue brief walks you through the successful actions taken by both districts and shows you how to ready your networks to become a platform for next-generation learning.

Monterey Peninsula Unified School District Builds a Network Foundation

Altemeyer's first step was to nearly triple his IT staff to 14 so he could have the manpower to support the network and technologies once it was in place. He then went out to staff, district officials, parents and students and asked what they wanted to see in the classroom and district buildings.

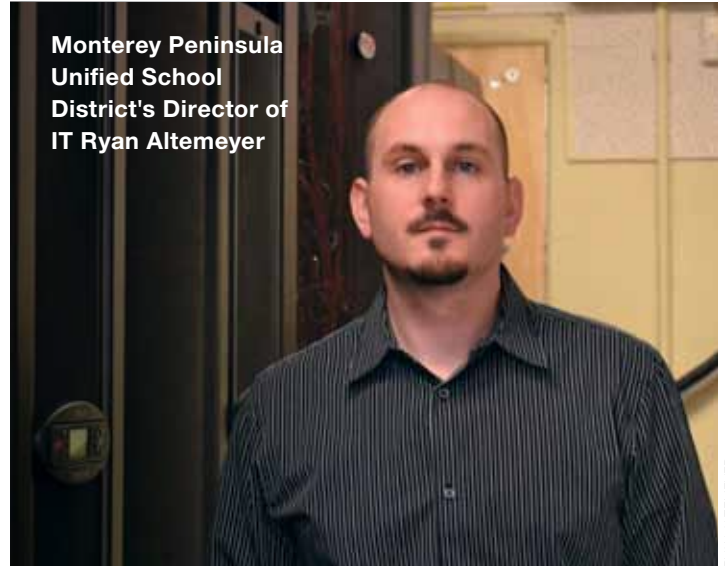
"We knew what the demands and trends were," he says. "Mobile would be big, online testing would be big and then eventually we knew everyone would be one-to-one with an Internet device. We also asked how do we improve communication at the site, between the front office and teachers, and looked at our phones, intercoms and bell systems. It all ties into the network."

Initial work on the overhaul started in spring 2010, supported by local capital facilities improvement and federal E-Rate funding. Community buy-in, he says, was the key to eventually getting a \$110 million bond passed in November 2010 — with 70 percent support — in the middle of the economic downturn.

With the money in hand, Altemeyer then "evaluated the network topology, looking at how to roll out a huge network in a consistent manner." The pre-planning included how the network would look, what was needed at every school and how the network design would be laid out, among other considerations. Architecting a network for the future is "not something you want to do piecemeal and slap together haphazardly," he says. "You want an overall vision about how it is going to be engineered and then built accordingly."

Choosing an IT engineering partner that could scale and be consistent over a multi-year project "was pretty instrumental in

**Monterey Peninsula
Unified School
District's Director of
IT Ryan Altemeyer**



RYAN ALTEMEYER

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RYAN ALTEMEYER, DIRECTOR OF INFORMATION TECHNOLOGY,
MONTEREY PENINSULA UNIFIED SCHOOL DISTRICT

getting the project accomplished," says Altemeyer. "We had people with the necessary skills to help us with the pre-planning phase and then had the engineers who could execute on those plans. We also had consistent personnel throughout the project so they could just come in and hit the ground running with one building and move on to the next."

"The partner we chose became an extension of our IT department," he says. "There were no delays because they were able to work on everything simultaneously."

Having that expertise became important when it came time to modify the plan, which MPUSD had to do when IT realized that the district's data center also needed an upgrade to handle the new network and capabilities. The data center upgrade included boosting power and cooling systems.

"Our plan did change quite a bit," says Altemeyer. "In the second round of our project, we figured that the network design was not sufficient for what we needed to accomplish with IP video cameras, building management systems and BYOD access that we had not thought about back in 2009."

By the spring of 2014, MPUSD will be complete with its basic infrastructure phase, which gives every school a solid network foundation to run advanced applications. "We now only have eight schools that need some form of basic network infrastructure," Altemeyer says. "We're going to complete four over the summer of 2013, and then the goal is to have the remaining four done by spring 2014."

The next phases will include desktop virtualization for student access and labs, a broader bring-your-own-device (BYOD) implementation and preparing for California's mandated online testing.

Wheaton-Warrenville CUSD 200 Transforms Learning with Robust Network

Throughout 2011, Wheaton-Warrenville officials replaced switches and installed wireless coverage in all of the district's 20 buildings, and moved its telecom operation from five different and incompatible land-line phone systems to a single Voice over IP solution. The comprehensive upgrade also included a new library system, a new student information system, switching district email, upgrading software, and adding Active Directory for secure staff and student log in.

The district chose to build out wireless quickly because many of the schools had facilities dating back to the 1950s and 1960s and had limited power in each classroom. "It was like the wild, wild west," says Mack. "We had all different equipment and there were no passwords, so the staff members were not using the equipment effectively."

Mack and his team spent a few months assessing what the schools had in place and then looked at current and future trends. Working with an outside project management and engineering team, they completed a network assessment to help decide what components were needed and would scale for the future. Like MPUSD's project, Wheaton-Warrenville's plan changed while in progress.

"At the beginning, our goal was 100 percent coverage," Mack says. "But by the end of our planning and before the RFP went out, we went for saturation in the classrooms in the middle and high schools, which more than doubled — and almost tripled — our wireless access points."

Since many students would eventually bring their own devices to school, he didn't want the classrooms fighting for wireless access with students using their devices in the hall. "I also didn't want to go back to the board or voters and say 'Yes, we spent a couple of million dollars a couple years ago but we didn't buy enough access points,'" says Mack.

One of the biggest reasons his upgrade was successful was having the outside support from the engineering team, especially

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RODNEY MACK, EXECUTIVE DIRECTOR OF TECHNOLOGY,
WHEATON-WARRENVILLE CUSD 200

since Mack was previously an educator. "I started out as a third-grade teacher and in my first year teaching I didn't get a computer because I was the new guy," he says. "I would have never known all the little things, and the questions to ask without the engineering team."

In addition, the vendor's project management services were invaluable, he says. "That piece was a real big factor. I knew we needed more than someone's help to set the network up and just plug it in."

Network Upgrades Empower BYOD, Wireless Access, New Learning Systems

The changes in both districts are striking, both Mack and Altemeyer say. "The impact has been huge," Altemeyer explains. "We just rolled out 2,200 laptops for the online assessments, all which needed wireless infrastructure. If we didn't put the network in, that wouldn't have been possible."

Monterey also implemented 1,000 tablets, which would have been useless without wireless to support them. "The biggest impact for staff and principals is that they don't have to think about 'Hey, is this going to work?' Before there was a lot of apprehension to do anything because they just didn't know if it was going to work," says Altemeyer.



Wheaton-Warrenville CUSD 200 students use tablets for project-based learning.

Now, the question is not whether it will work, but teachers are asking whether certain technology is going to help the students learn, and "that's a huge leap," Altemeyer says. "We want them to think about the technology; we want them to use it and come up with new and creative ways to foster student engagement."

Teachers are integrating high-speed videos into their classrooms and bringing their own devices to school. "I love to see what they [students] are doing on regular machines where they don't have to wait for a buffer for downloads," Mack says. "We're also seeing a lot of regular [wireless] connections coming from students using their own devices."

Their IT departments have also been transformed from departments putting out fires to proactive team players that help staff members accomplish their tasks much more efficiently.

"Now that we have a robust network, we can push out applications quickly and we have a monitoring system that lets us know when things might go down," says Altemeyer. "We're much more proactive."

"It's the little things that we've noticed," adds Mack. "Before we had to troubleshoot issues never knowing what was wrong. We might drive to a school first and unplug several things without knowing what really went wrong. Now, we get the first three things

out of the way quickly because the network shows us what's going on. Solving problems is much faster."

The Next Revolution in Learning is Network Based

Preparing K-12 school districts for next-generation learning requires more than just providing new tools and technology for classroom success. Districts need to take a look at their underlying networks to see if they have the right infrastructure in place to handle new technologies, new devices and the scaling needs that come with high-speed video streaming.

Before districts invest in new technology tools for the classroom, they need to upgrade their network infrastructure. To avoid surprises and achieve optimal success, districts need to assess their existing networks, architect their networks for the future and enlist the aid of an experienced engineering team that can scale to meet all the district's needs.

"The next revolution in education is going to be in computer and IT, and is network based," says Altemeyer. "Anything that you want to do requires the Internet and the network is the foundation."

What leads to a successful network upgrade?

Monterey Peninsula Unified School District's Director of Information Technology Ryan Altemeyer and Rodney Mack, executive director of technology for Illinois' Wheaton-Warrenville CUSD 200, offer these 11 tips for successful network and technology upgrades:

1. Pre-plan along with your classroom technology purchases. You can't just buy devices and think they will work.
2. Make sure you have a good IT team in place to support the network and users, and before everything is up and running.
3. Get outside project management and engineering help from a firm that can scale and augment IT in order to fill in knowledge gaps.
4. Take an inventory of your current network; decide what to use and what to eliminate.
5. Consider efficiency and affordability when determining what to purchase.
6. Plan how to accomplish the rollout, and what support will be needed.
7. Determine what testing will be needed and who is going to test.
8. Get buy in from tech-savvy teachers who can help support and train others how to use tools.
9. Be prepared for surprises, such as the need for facilities, power and cooling upgrades.
10. Be flexible as the upgrade progresses; you may need to reassess some aspects, such as wireless access point needs or data center capabilities.
11. Plan for future technology needs.

Endnotes

1. All quotes from Ryan Altemeyer from CDE interview conducted on March 1, 2013.
2. All quotes from Rodney Mack from CDE interview conducted on March 12, 2013.



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Transforming Education with BYOD Solutions

Bring the freedom to learn anywhere, anytime, with Cisco K-12 Education BYOD Solutions. These bring-your-own-device solutions provide the freedom to go anywhere on campus and still perform the tasks you would on a wired network. School wireless improves collaboration, and also:

- Deploys new teaching tools that facilitate teaching innovation
- Exposes students to a differentiated curriculum
- Opens up access to enhanced teaching and learning resources
- Increases physical safety to create a highly secure school environment