WHITE PAPER

The Connected Classroom: Why Technology is Fundamental to Education

From online resources, collaboration, 1:1 initiatives and more, technology is crucial for schools of any size. Here's how to build a solid foundation amid tight budgets and lean IT staffs.

COMCAST BUSINESS

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The classroom of today is quite different from even 10 years ago, as technology has become fundamental to education, at both the K-12 and higher education levels. Educators and students alike routinely turn to online resources for educational materials and collaboration tools day in and day out. One-to-one initiatives are common, with students using their own computing device, as are online standardized tests.

To keep pace, schools need to ensure they have robust, reliable network infrastructure in place, including high-speed Internet access and fast in-building Wi-Fi networks. Voice remains critically important, for communication both within the school and the outside community, as is video, for access to various televised resources. And of course, it all must be secure, both to ensure students have access only to appropriate content and to protect the network from outside threats.

Educational institutions essentially must meet many of the same demands as commercial companies, but typically they lack the same budgets and IT staff.

"At the K-12 level, the number one issue is staffing levels, followed by budgetary constraints," says Chris Prekopa, Division Director, Public Sector and Education for Comcast Business. **"In terms of technology, the focus is on ensuring kids have the resources required to access content in school and at home. That's mandatory for the 21st century learners."**

Numbers Tell the Story

Technology in education is important enough that the federal government has been increasing funding for tech spending in schools rather dramatically and in a variety of programs.

The federal E-Rate program provides discounts to schools and libraries for investments in telecommunications and related services, including Internet access. Discounts range from 20% to 90% depending on the economic status of the district and whether the school or library is located in an urban or rural area.[1]

The program is administered by the Universal Service Administrative Company under the direction of the FCC. In 2014, the FCC increased the cap for the program to $3.9 billion for 2015 and indexed it to inflation going forward. The cap for 2019 is $4.15 billion. Additionally, in 2017 Congress allocated $400 million to the **Every Student Succeeds Act** (ESSA), which is designed to support three initiatives:

- Real well-rounded education
- Safe schools
- The effective use of technology.[2]

Just two years later in 2019, the figure rose to $1.79 billion, **an increase of $ 1.39 billion or more than 75%.**

School districts have no shortage of ideas on how to spend money, according to a survey of 622 districts by the School of Superintendents Association, the National Association of the Federal Program Administrators, and the Whiteboard Advisors.[3]

Top responses include:

Implement system-wide approaches to support teacher professional development/ collaboration—**55%**

Implement blended learning strategies—**44%**

Buy digital services—**42%**

Develop or provide personalized learning pathways for students—**37%**

Discover, adapt, and share high-quality resources—**23%**

Drivers for Technology in Education

Those responses demonstrate educators have a keen interest in adopting technology effectively in their classrooms—and technological innovation has influence over every initiative on the list, not just buying digital services. The overall goal, of course, is to improve education, and technology can help do that in any number of ways.

There are vast amounts of online resources available to educators. They include popular online Google apps that enable students to collaborate with one another and with teachers, as well as iTunes U, which provides a collection of free educational content as well as apps that help teachers make effective use of iPads. A whole universe of open source educational resources are available online from all sorts of sources.

Within the classroom, technology helps teachers be more effective with large classrooms and students who have differentiated learning needs. A teacher with a classroom of 40 students, for example, could have half the group work independently using online resources while providing live instruction to the other half—then switch when the time is right.

"Class size continues to be a challenge for schools," Comcast's Prekopa says. **"Teachers are finding creative uses of technology as a way to make better use of time and get better student engagement."**

Even in smaller classes, technology enables all students to work at their own pace and at their individual level of expertise with the subject matter. More advanced students can get more challenging work and vice versa—without anyone being singled out among their peers as more or less advanced.

Collaboration is becoming increasingly important, as educators are finding value in students working in small groups. The availability of Wi-Fi to access online resources, other students and teachers help enable collaboration, both in school and from home.

To support all of these initiatives, Prekopa notes many districts are implementing 1:1 programs, where each student has a computing device to use whenever it's needed—including at home. Studies have shown 1:1 programs have a **"statistically positive impact on student test scores in English/language arts, writing, math, and science."**[4]

Online standardized tests are another significant driver for technology. They require many students to be taking the test at the same time, which means the school needs to have a network robust enough to meet the demand.

Finally, technology can help schools improve communication overall: teachers can communicate with students via online tools, make homework assignments available online, and enable students to ask questions and submit assignments electronically. Schools are also implementing online applications that enable parents to keep tabs on their kids' grades, homework assignments, and the like.

Building a Sound Technology Foundation

Supporting these various initiatives requires schools to have reliable, scalable, and secure supporting infrastructure in place, to address a number of requirements.

It starts with a wide-area network (WAN) that connects the various schools in the district to each other. This is important to support communications among administrators, to support collaborative efforts between schools, and for reporting on attendance and other mandatory regulatory requirements.

A fast, reliable Internet connection is another must-have, even for smaller schools. It's fundamental to online learning and for accessing various educational resources.

Similarly, a fast, reliable Wi-Fi network needs to be easily accessible across each K-12 school building and grounds. For higher-ed institutions, the Wi-Fi network should blanket the entire campus. **"In higher education, it's about student mobility,"** Prekopa says. **"Students are going to want to work all across campus—in community spaces, classrooms, cafeterias, even on shuttle buses."**

The Wi-Fi network should also have management tools that enable IT to easily monitor usage, capacity, and the health of the network.

Schools also require access to cable television, and streaming services to bring news and other programming into the classroom. In a high school, for example, watching television shows can be a form of research for marketing classes.

Voice services are important for administrators to communicate with community members, most notable students' families. Inside the building, room-to-room voice

is also important, for things like daily announcements, emergency messages, or simply to call a student down to the office, such as for an early dismissal.

Schools also need a heavy dose of security, such as to mitigate against distributed denial of service (DDOS) attacks that can take down their networks, as well as multi-level security protocols for accessing the network remotely. Web filtering tools are also important, to ensure students aren't accessing content that they shouldn't be.

Challenges in Adopting Technology for Education

Adequately addressing each of these requirements can be a challenge for any organization. But, as previously noted, it's even more difficult with limited IT staff and budget. Like all organizations, educational institutions are challenged to attract and retain talented IT staff, complicated by understanding the layers of need.

And it helps if the IT personnel understand educational requirements for technology in the classroom. Plus, schools have IT requirements for administrators that are much like other organizations, including finance and human resources.

With respect to budget, the challenge in education is that roughly 75% to 80% of school budgets go to paying teacher and other staff salaries, typically under well-defined contracts. Add in other mandatory costs, such as utilities, supplies, and maintenance, and there's little left over for discretionary spending.

So, schools must plan carefully and well in advance for technology spending. Programs such as E-Rate help considerably, with the reimbursement rates of up to 90%.

E-Rate may be used to cover Internet access, WAN services, and some related equipment, including routers, switches and the like.

SD-WAN Offers Education Relief

Software-defined WAN (SD-WAN) services are also becoming more prevalent in education as a way to deal with budget constraints.

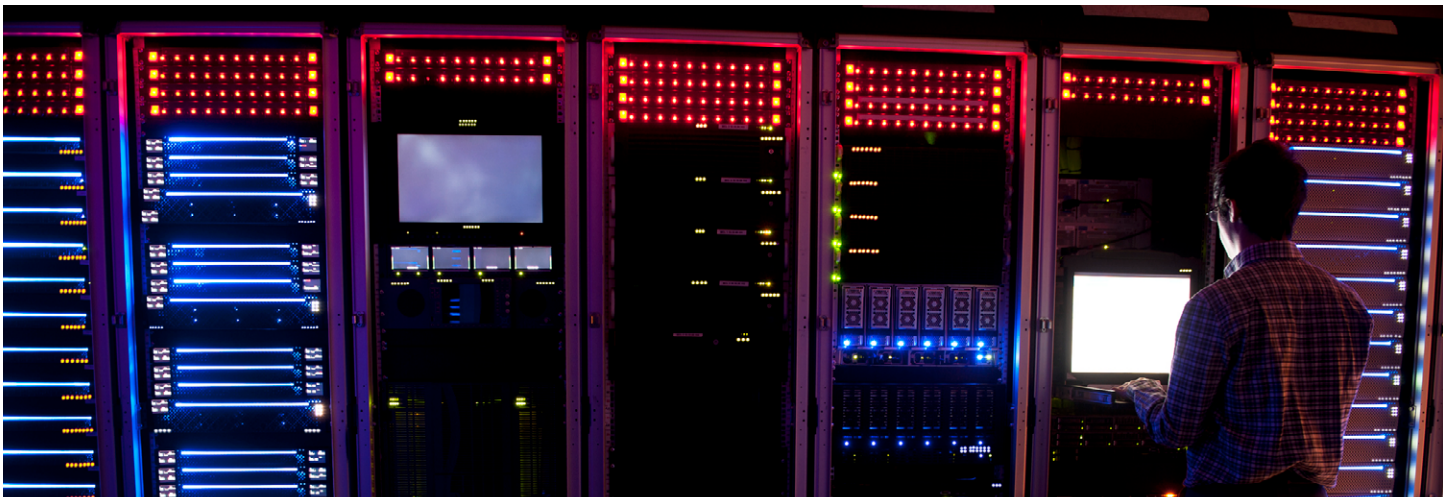
Like other software-defined network applications, SD-WAN decouples network hardware from control functions, placing traffic management functions in a centralized controller. And only a single physical or virtual appliance is required at each school to support SD-WANs, rather than the traditional switch/router. SD-WAN is scalable as needs expand, and there is no additional incremental capital expenses associated with that scalability.

That helps school districts get out of the hardware business and focus more on software-defined services and how they're applied. Schools can invest in virtualized services on as-needed basis. For example, a single SD-WAN appliance can support a wide variety of functions including security services, network performance monitoring, and control, and routing among schools.

SD-WAN centralized control over the network makes rolling out updates, security upgrades simultaneously, and identifying problem areas on the network very efficient.

The Way Forward—Partnering for Success

Some educational institutions have found outsourcing IT is a cost-effective and efficient way to address the IT staffing shortage—working with specific subject matter experts that can help them meet specific requirements. That means a provider that can address WAN, Internet, Wi-Fi, video, voice, and security services. A partner that can offer SD-WAN services is also a plus, given its increasing prevalence in education.



A provider that offers managed services can further ease the IT burden, by taking on day-to-day management tasks associated with WAN, SD-WAN, security, and other services.

The partner should also be able to offer guidance around best practices for school technology deployments and help with overcoming the digital divide. That means providing guidance on how to navigate the E-Rate landscape, which can get complex. It also means offering help with securing low or no-cost home broadband services for students who need it—because learning today extends far beyond the classroom.

It's an exciting time in education, as technology is opening new frontiers.

[1] E-Rate - Schools & Libraries USF Program, Federal Communications Commission.,
[2] "ISTE shows schools how to spend $1.17 billion on edtech in 2019," Dec. 17, 2018, Edscoop,
[3] "Bringing ESSA Title IVA to Life: How School Districts Are Investing Student Support & Academic Enrichment Funding," June 2018,
[4] "1-to-1 Laptop Initiative Boost Student Scores, Study Finds," May 17, 2016, Education Week,