Students first

Getting ready for 21st-century education

- Connected Infrastructure: Assessing readiness for digital learning
- Professional learning: Preparing teachers for the digital age
- Data dilemma: Containing an expanding universe of digital content
- Customer perspectives: Peer learnings from 21st-century education in action

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2011 Issue
Engage learners in the digital age.

Find the educational resources to create a rich, immersive classroom environment that will help you tailor learning and foster collaboration with technology from Dell. Experience Dell.com/EngageLearners.
Preparing teachers for the digital age

By Adam Garry

By designing customized professional learning programs using an outcome-based model, Dell™ Professional Learning Services can help school districts meet specific educational needs, make effective use of technology, and accelerate student learning.

Assessing technology readiness to support digital learning initiatives

By Martin Yarborough

Enthusiasm about transitioning to an interactive digital curriculum is bringing a key prerequisite under scrutiny: the underlying IT infrastructure. A Dell IT simplification assessment helps align technology strategy with educational and budget goals.

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Welcome to the Education edition of Dell Power Solutions Magazine. It’s an exciting time for students and educators as teaching and learning environments are evolving to support collaborative learning, teach 21st-century skills, and provide anytime, anywhere access to learning.

In the not-too-distant future, this generation of students will be working in a highly competitive, global workforce. Tomorrow’s jobs will require students to communicate, collaborate, innovate, and be critical thinkers.

That is why school districts are exploring ways to integrate rich digital content, social media, and interactive learning platforms. As part of our commitment to supporting this change, Dell works directly with educators and key partners, such as Microsoft, to develop the best tools and resources that enable personalized learning inside and outside of the classroom walls.

Additionally, Dell has made it our mission to help schools uncover significant cost-savings right now, so that budget cuts don’t slow down your ability to make the technology and professional learning investments required to reach your critical education goals.

We are uniquely positioned to help districts find ways to simplify the management and cost of their IT infrastructures. For example, one of our education specialists recently helped a school district like yours fund a campus-wide wireless implementation to support its digital learning initiative—by dramatically reducing burdensome costs in its legacy infrastructure.

Dell can help schools transform education for the digital age by addressing needs within the entire school system—from the classroom, across the network, and into the data center.

Please enjoy the following articles that address many of the daily challenges we help educators tackle as they make this critical teaching and learning environment transition in today’s tough economic environment.

Respectfully yours,

Bill Rodrigues
Vice president and general manager, Education
Dell
Students first:
Getting ready for 21st-century education

By Bob Moore

Digital content and collaboration technology in the Connected Classroom are reshaping the K–12 learning experience to help students compete successfully in the digital age. How does your school district measure up?

The digital age is here. Thanks to the Internet, every student on the planet now lives in the same global village. In just a few short years, many will be competing for jobs with the best and the brightest talent from around the world. To succeed in the 21st-century workplace, children need cognitive and collaborative skills that will equip them to solve complex problems we can’t even imagine today. Fortunately, our students have a head start. Technology has permeated every aspect of their lives since

Figure 1. The Dell Connected Learning environment helps school districts accelerate digital learning and collaboration initiatives

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Technologists more efficient
Teachers more interactive
Administrators more successful
Community more aware
Parents more informed
Students more engaged
Parents more informed
birth—and as a result, they are digital natives. They communicate, collaborate, and learn differently than previous generations. And they flourish in multidimensional educational experiences that reflect this new reality.

Of course, retooling education for the digital age involves much more than installing computers in the classroom or sending students home with e-book readers. It calls upon every member of the educational system to unite around the common goal of improving the quality and the relevance of instruction.

But while educators may agree on the necessity of developing a digital curriculum that is flexible enough to help individual students achieve their highest potential, many school districts face severe budgetary constraints, especially in communities heavily affected by the recent economic crisis. At the same time, increasing student populations make the traditional classroom model challenging to sustain in purely financial terms.

Pioneering school districts are already reaching far beyond traditional classroom boundaries. By building on how students interact with technology in their daily lives, the Dell Connected Learning environment helps educators and technologists work together to create the framework for a collaborative, digital content–based curriculum. This approach embraces different learning styles easily and cost-effectively on a wide range of personalized computing devices.

Thriving in a Connected Learning environment

Connected Learning starts by connecting people (see Figure 1). This comprehensive approach represents a fundamental shift in the way K–12 education is developed and delivered. It involves not only students and teachers but also administrators, technologists, parents, and even the community at large. Connected Learning environments focus on two principal areas:

- **Connected Classroom:** The Connected Classroom pairs personalized computing devices with dynamic digital content tailored to each student’s learning style. The result is an engaging, highly interactive educational experience that enriches traditional teaching practices and facilitates student-centered learning. In addition, professional learning services help instructors and administrators explore how to effectively integrate technology into daily teaching practices, to heighten productivity, creativity, communication, and collaboration.

- **Connected Infrastructure:** Because technology forms the backbone of any Connected Learning environment, it’s crucial for school districts to ensure that the supporting IT infrastructure is open, capable, and affordable. The Connected Infrastructure delivers an optimized technology framework that helps school districts keep the focus on advancing their educational agenda. By starting with a holistic assessment of the existing infrastructure and IT management practices that support the educational system as a whole, experienced educational consultants can help schools simplify technology management and guide technology investments to maximize efficiency and minimize costs.1

A Connected Learning environment also helps forge important new partnerships by facilitating communication between educators and IT staff. The resulting collaboration accelerates digital curriculum adoption and helps ensure that the supporting

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Create your own Connected Classroom

The Dell Connected Classroom site helps teachers, administrators, and IT leaders envision and explore how to create a Connected Learning environment in their own schools. The site features an interactive product guide, and demonstrates various K–12 classroom experiences in which educational technology enriches the teaching and learning process. The site features interactive videos addressing:

- Overall classroom environment
- Students with special needs
- Math and science curriculum
- Students for whom English is a second language
- Professional learning for teachers and staff
- Underlying IT infrastructure supporting a Connected Learning environment

In addition to the videos, discover funding opportunities, educational research and reports, and case studies of schools that are already benefiting from the Connected Learning strategy. To learn more, visit dell.com/connectedclassroom.
Connected Learning

Enriching the learning experience to heighten educational outcomes

An infusion of technology sparks excitement in the classroom and helps teachers create surprising opportunities that inspire children to participate enthusiastically in their own education. A Connected Learning environment provides constant access to rich digital content, encompassing tools such as video editing and Web publishing software that give students imaginative outlets to express their creativity and demonstrate concept mastery. In addition, the Connected Learning framework allows children to collaborate on projects, explore the world around them, and learn in ways that are suited to their specific educational needs. And now, mobile access technologies make anytime, anywhere learning a reality.

A Connected Learning environment helps teachers tailor their lesson plans to accommodate different learning styles, enriching their instruction through easy access to worldwide educational resources. Extended professional development opportunities and online teaching communities also help educators continuously improve their expertise and swap fresh ideas. In the classroom, teacher-friendly dashboards show real-time student response. Moreover, evaluation tools enable teachers to assess student progress based on formative and summative data, adjusting lesson plans and instruction styles to enhance educational outcomes.

In addition, a Connected Learning environment helps teachers communicate efficiently with students, IT staff, administrators, and parents. By learning about student programs and achievements, community members and local business leaders can also contribute to the educational process by introducing outside perspectives, expertise, funding, and community resources. And it’s a two-way street that also creates opportunities for students to get involved in the community.

Equipping administrators and IT staff to manage efficiently

For administrators, a Connected Learning environment provides a unified view of the educational system’s efforts to prepare students for college and career. Administrators can use real-time, formative, and summative data to evaluate the success of digital curriculum initiatives based on teaching and learning outcomes, and to prioritize ongoing professional learning for teachers. By helping administrators identify which programs are generating the best results, a Connected Learning environment helps school districts focus technology budgets on productive educational initiatives. In addition, mobility and access technology allows administrators to manage instructional and staff resources anytime, from anywhere.

IT leaders can help address budgetary concerns and optimize educational investments by identifying ways to do more with less—delivering the right technology at the right time and managing the computing infrastructure as securely and efficiently as possible. Automated technology management tools and reduced
operational expenses also free IT resources to support digital curriculum development and educational outreach.

Aligning the technology strategy with educational objectives

Many schools now spend a majority of their IT budgets on routine systems maintenance rather than innovation in the classroom. In comparison, a Connected Infrastructure is designed to minimize day-to-day maintenance by increasing operational and cost efficiencies through standardization, simplification, and automation. Enhanced IT efficiency has a positive impact on educational outcomes because it frees technology resources to focus on digital learning programs that advance student achievement.

Moreover, Dell technologies are designed to make managing and delivering digital learning environments affordable. This helps school districts meet their educational goals while coping with deep budget cuts.

Realizing the benefits of digital learning initiatives

The digital age brings with it enormous opportunities for transforming the teaching and learning environment to improve the quality and relevance of K–12 education. Embracing the way children use technology in their daily lives benefits every member of the educational community as it prepares the next generation for successful life in the 21st century. Most importantly, investing in a Connected Learning environment today promises far-reaching results tomorrow—cultivating the essential critical-thinking, problem-solving, communication, and collaboration skills children will need to help build a better future for everyone.

Footing the bill for education technology

In addition to traditional sources such as state and local funding, many grant programs are available to help schools advance innovative teaching and learning initiatives—including needed technology to support the program.

dell.com/education/funding

Bob Moore is the director of business development for Global Education at Dell. He joined Dell in 2009 after 21 years of senior leadership in K–12 education.

Learn more

Dell Connected Classroom: dell.com/connectedclassroom
Dell Connected Learning: dell.com/connectedlearning
Dell K–12 education: dell.com/k12
Microsoft education initiatives: microsoft.com/education
Welcome to the classroom of the future

Twenty-first-century students need a 21st-century learning environment—and forward-thinking Hall County Schools is at the head of the class.

Piloting the course to a blended learning environment

- The HALLCOnnect digital learning platform, co-designed with Dell education specialists, provides an online meeting place for students and teachers to learn collaboratively.
- Course content is indexed by both state requirement and learning style, so individual students can interact with educational materials in the ways that are most engaging and effective for them.
- The HALLCOnnect platform also encourages teachers to pursue constant professional development by sharing ideas, content, and best practices across subject areas.

Technology is interwoven with virtually every aspect of life in the 21st century. But simply replacing textbooks with online content isn’t enough to create technological fluency or cultivate the type of critical thinking, problem-solving, communication, and collaboration skills essential for students to succeed in the digital age. As a result, cash-strapped public school systems everywhere are facing some tricky decisions.

Hall County—encompassing a public school district in Georgia that serves more than 25,000 students in 33 K–12 schools—is tackling the problem head-on. “Our students are not competing against students from our neighborhood, our state, or our nation. The competition for future jobs and our economic superiority is with students from around the world,” says Dr. Aaron Turpin, executive director of technology at Hall County Schools. “So the question was not whether we could afford to create a 21st-century learning environment. The question was how we were going to afford it.”

Hall County Schools engaged Dell education specialists to facilitate a Learning Summit in which every group of stakeholders came together to question, listen, challenge, and clarify how a digital learning environment would take shape. Through this process of discovery, educators teamed up with administrators and technology experts to define a vision of blended learning that would guide the development and implementation of the HALLCOnnect Connected Learning platform.

The goal for Hall County Schools was to create an environment in which learning can occur anytime and is based on each student’s needs, abilities, voice, passion, and learning style with the teacher as a facilitator of learning. The school district envisioned a system
in which new knowledge is created from multiple sources, and students can engage with materials on their own terms and timetables. The district expects HALLCOnnect to encourage subject mastery and give teachers effective ways to evaluate student progress and develop innovative course content.

Once Hall County established its vision for the platform, the technology team began preparing the district’s IT infrastructure for the new digital learning environment. The team increased network bandwidth between schools, built a data center with a projected 10-year lifespan, and installed wireless access on all campuses. The board of education modified district policy to allow students to use their own netbooks, laptops, tablets, and smartphones in the classroom. In-school computer labs were closed in favor of mobile access, and district-wide videoconferencing was implemented to accelerate professional learning opportunities.

During the first semester of the 2010–2011 school year, the HALLCOnnect pilot focused on middle school grades 6, 7, and 8. Following successful completion of that first phase last December, Hall County plans to expand the middle school program and extend it through the school district’s 33 schools.

The HALLCOnnect platform itself—based on a cloud environment and Agilix learning management tools that allow students to use whatever access device they prefer—offers an Internet-based meeting place for students to talk about classroom content with both teachers and peers. “That’s an important difference from traditional classroom instruction,” notes Penny Christensen, e-learning specialist at Hall County Schools. “Instead of always going to the teacher with questions, students can learn from and teach each other. It’s a highly collaborative style of learning—and it gives students technology-based teamwork skills they will need later in life.”

In the long term, Hall County expects that matching course content to each student’s individual learning style will help increase enthusiasm and boost grades. Perhaps more importantly, the district hopes to help students understand their own learning preferences and use them to engage with content they find compelling. “If we help a student learn how he or she learns,” says Christensen, “then we have accomplished a lot more than just teaching the content in that one course.”

Learn more

Dell Connected Classroom: dell.com/connectedclassroom
Dell K–12 education: dell.com/k12

Creating a rich, rigorous learning experience

Teachers and technologists are collaborating to transform the educational process in exciting new ways designed to help children master the skills they need for success in the 21st-century workplace. Learn more about how students at Hall County Schools in Georgia are getting a head start.

dell.com/k12/resources
Assessing technology readiness to support digital learning initiatives

By Martin Yarborough

Enthusiasm about transitioning to an interactive digital curriculum is bringing a key prerequisite under scrutiny: the underlying IT infrastructure. A Dell IT simplification assessment helps align technology strategy with educational and budget goals.

Digital content, blended learning, and interactive classroom technology offer unprecedented teaching opportunities that are transforming the educational experience. Constant access to digital content allows children to continuously explore and ultimately solve complex problems through self-directed interactions with other students, teachers, educational resources, and social networks around the world. In the process, students also develop essential critical-thinking, communication, and collaboration skills that will help them to succeed in the competitive global society.

Before school districts can deliver on this vision, however, they must ensure that suitable backbone technology is in place. In particular, a rich digital learning environment must allow students and teachers to produce content and access data at any time of day or night, from wherever they happen to be. The challenge is to create a secure but agile educational framework without ripping and replacing the existing technology infrastructure, and without adding new IT staff.

A technology simplification assessment can help districts cost-effectively transition to a 21st-century digital curriculum. Key benefits of a technology simplification assessment include identifying the architectural, financial, and operational components of the school district’s current IT infrastructure; analyzing and rating the capabilities of this infrastructure to support educational best practices for the digital age; and identifying opportunities to improve management and operational efficiencies.

Recognizing common technology stumbling blocks

At the outset, school systems may need to address a technology gap. As educators develop objectives for digital learning initiatives, many school districts are finding that comprehensive 21st-century curriculum and digital content requirements outstrip current IT capabilities and service-desk requirements. And that is not surprising because many school IT infrastructures were designed to support a completely different—and much simpler—educational agenda.

At the same time, long life cycles for legacy products still in service may saddle the IT team
with complicated maintenance requirements, particularly when linchpin computers, printers, and other IT equipment remain up and running past warranty. The proliferation of personalized mobile computers in the classroom increases demand for device management and wireless access to networked school resources—both on and off campus. And today’s exploding data volumes, coupled with the need for long-term storage to meet continuity and compliance requirements, put pressure on information management strategies as well as security and capacity planning.1

An IT simplification assessment can address intensified requirements for technology infrastructure, data access, and service-desk response in digital learning environments. By taking a proactive approach, school districts can help reduce costs and ensure that instructional technology works seamlessly, avoiding interruptions in learning time that could interfere with student progress. In addition, instituting an ongoing professional development program can be instrumental in helping teachers effectively integrate digital learning technology into their daily teaching practice.2

**Conducting a technology readiness assessment**

The Dell IT simplification assessment can help school districts take stock of their current technology investments and explore ways to streamline the IT infrastructure to cost-effectively support a digital learning environment. To begin with, Dell education specialists engage all stakeholders—including administrative leaders, curriculum directors, teachers, and IT staff—in an active dialogue to draw out and define what the digital learning environment will look like. That vision guides the Dell team as it translates digital content requirements into recommendations for a supporting IT infrastructure that is expressly designed to deliver on the district’s educational objectives.

The Dell team systematically assesses hardware platforms, applications, storage management tools, networking architecture, and mobile connectivity currently in place. Then, it provides actionable recommendations in any or all of five key technology areas, including potential financial benefits and positive educational outcomes the district may expect to achieve by addressing technology issues (see Figure 1).

Often, the process involves uncovering root causes that may not be immediately apparent. For that reason, a Dell education specialist typically spends five weeks in the school or the school district environment. This approach enables the Dell team to gain an understanding of not just the technical aspects, but also the cultural aspects of how educational delivery

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mechanisms need to operate in a particular school system. The result is an end-to-end evaluation from ‘as is’ all the way through ‘to be.’

As a final step, Dell provides the district with a detailed road map recommending best-in-class technology improvements specifically tailored to educational infrastructures. This road map is designed to improve IT efficiency and effectiveness while helping to reduce the time and money required to deploy, manage, and maintain a robust digital learning environment. Dell also works collaboratively with school districts to identify ‘quick hit’ improvements that can be implemented immediately.

Creating a flexible framework for successful educational outcomes

Getting educators, administrators, and technologists together to define the school district’s vision for a digital learning environment helps ensure that IT initiatives are in step with educational objectives. When conducting an IT simplification assessment, Dell education specialists help school districts assess their current technology and operational infrastructure, and then create a road map designed to streamline adoption of digital content and collaboration tools.

In addition, the assessment identifies opportunities to simplify IT operations, improve IT management efficiency, and increase service-desk response (see the sidebar, “Redirecting resources to innovation”). IT simplification measures help school districts expedite the educational agenda for each school within a flexible and highly scalable framework for ongoing curriculum development and growth.

Redirecting resources to innovation

As school districts move toward collaborative digital teaching and learning environments, a Dell IT simplification assessment helps ensure that the requisite technology infrastructure is in place to support educational objectives. Key opportunities for improvement include the following:

- **Learning:** Leverages classroom technologies to best advantage for exceptional educational experiences and outcomes
- **People:** Increases technology infrastructure efficiency, freeing the IT team to engage in strategic educational projects
- **Time:** Allows fast, flexible deployment of technology as well as new and changed curriculum; accelerates service-desk response
- **Budget:** Helps reduce expense of deploying and maintaining IT infrastructure; enables technology funding to be redirected toward classroom innovation

By optimizing the technology infrastructure and enhancing IT management efficiency, school districts can reallocate scarce IT resources from routine systems maintenance to educational innovation. The Dell IT simplification assessment offers expert, technology-agnostic advice and a wide variety of cost-effective IT infrastructure options through the extensive Dell business partner ecosystem.

Martin Yarborough is an executive in the IT Simplification Practice for educational solutions at Dell. He has served in public education for 30 years, in roles as teacher, chief technology officer, and chief information officer.
Baltimore County Public Schools

Education is the name of the game

By working advanced 3D gaming technologies into the educational environment, a Baltimore County high school sparks excitement in science, technology, engineering, and math—helping students master key concepts and stay focused on learning.

Chesapeake High School, in the Baltimore County Public Schools system, was struggling to engage students’ interest in an economically challenged area. Attendance and discipline were recurring issues, and the school district wanted to increase interest in STEM studies (science, technology, engineering, and math) to better prepare students for 21st-century careers.

The school tackled these challenges in part by introducing electronic gaming to inspire student interest and bridge the gap between their classroom experience and free-time activities. Students now learn math, science, and social studies in a top-of-the-line 3D simulation studio using the same equipment that teaches astronauts and submarine pilots to drive their vehicles.

The school’s simulation studio is designed to mirror the environment of the Johns Hopkins University Applied Physics Laboratory. It has two seats, each of which is surrounded by five 72-inch Samsung TVs powered by three Dell XPS™ 730x ARENA desktop computers running Windows. In an adjacent lab, each of 30 Dell XPS 730x desktop computers runs Windows and connects to three 19-inch Dell UltraSharp™ flat panel monitors. Every workspace includes headphones and a flight simulation joystick, and all can simultaneously display the same 3D environment so that an entire class experiences the same lesson at once.

“From the first day, students have taken to this environment like a bear to honey,” says Dan Scroggs, manager admin support, Baltimore County Public Schools. Now, the district is working to ensure that the games are teaching the engrossed students all the right lessons. And it is developing games based on school curriculum, rather than shaping lessons around parameters of prebuilt games.

In fact, 50 students recently competed in an extracurricular game-development contest and the winning ideas are being built by professional gaming developers.

In addition, the district is developing a virtual high school that also facilitates social interaction. Through virtual classrooms, students can access simulated curriculum and tools that the district cannot provide outside the simulation, such as an electron microscope. “In the physical world, our students can only look at plant cells through compound microscopes. But in our virtual school, they can use an electron microscope. That opens up entirely new experiences to them,” says Scroggs.

The next major challenge for Baltimore County Public Schools is to create learning environments similar to Chesapeake High School district-wide. “Game is no longer a four-letter word in our district,” says Scroggs. “The gaming environment is where students are, and we aim to teach students where they are, not where we are.”
By designing customized professional learning programs using an outcome-based model, Dell™ Professional Learning Services can help school districts meet specific educational needs, make effective use of technology, and accelerate student learning.

Preparing teachers for the digital age

By Adam Garry

Enabling students to incorporate technology into their work and collaborative processes is critical to preparing them for college and career in the 21st century. But to do this effectively, teachers must be prepared to plan and teach a digital curriculum—and that takes professional learning.

When developing technology-focused professional learning programs, school districts and schools should have a clear set of expected outcomes in mind—and then design their programs to meet those specific goals. This approach helps ensure that a teacher’s time is used wisely and supports professional growth.

As part of its Professional Learning Services, Dell has worked with partner school districts to identify three categories of professional learning: experiences, training, and professional development. By working with Dell education specialists, district personnel can use this conceptual framework to create customized plans that help them effectively integrate technology into the classroom and accelerate student achievement.

Identifying needs and expected outcomes

Understanding the three broad categories of professional learning can help school districts strike the right balance for their needs and expected outcomes. The first category, experiences, may include participating in conferences, hearing guest speakers, engaging in team-building activities, studying books or articles, taking university courses, or attending summer institutes. Experiences can provide educators with background and context, but they are not intended to change teaching practices or affect student learning.

The intended purpose is to ask participants to reflect on their practices while they discover fresh ideas and resources. This reflection leads educators to identify new areas to focus on and different ways to support current and future practices.

Training is designed to change teacher practices in some way. However, it does not include a direct link to or measurement of student learning. Training can be delivered through workshops, seminars, courses, independent study modules, facilitated modules, face-to-face instruction, or virtual environments. Training is associated only with teacher practices because training lacks the process required to influence student outcomes. Training is usually based on a set agenda that will drive the use of a
Developing skills for the 21st century

With a commitment to professional learning and continual fine-tuning of its laptop program, Henrico County Public Schools in Virginia is setting the standard for technology best practices in the classroom.

As part of its mission of fully integrating technology to enhance the education of its students and its teachers, the district makes sure that the 28,000 students in grades 6–12 have Dell laptops running Microsoft® Windows®. Teachers also have access to more than 90 different software applications from Microsoft and other Dell partners, which empowers them to be creative and innovative in how they deliver classroom instruction.

The benefits have been clear. A three-year study revealed that the laptop program contributed to an all-topics, all-years average gain of 7 percent on a Virginia Standards of Learning test scale. The study also showed that Henrico high school graduates who used laptops were better prepared for college than students from high schools who had not studied with individual laptops.

Meanwhile, the Dell Professional Learning Services program is helping teachers discover how they can use technology to further enhance student learning, and to establish an environment for teachers to learn from each other. “With Dell Professional Learning Services behind our laptop initiative, we are seeing more collaborative, student-centered work,” says Eric Jones, Henrico’s executive director of secondary education. “Students are developing more 21st-century skills—more problem-solving, critical thinking, and collaboration.”

When working with district personnel on a professional learning program, Dell uses a four-step methodology to help ensure that the program is effective for both teachers and students:

1. **Assess:** Diagnostics, surveys, and other tools help develop a comprehensive needs assessment with defined outcomes.
2. **Design:** Based on the assessment, Dell education specialists help the district develop a comprehensive approach that is designed to meet its needs and achieve the expected outcomes. This approach is based on the appropriate balance of experiences, training, and professional development.
3. **Implement:** Dell education specialists work with the district to implement the plan on a schedule that fits with other technology initiatives.
4. **Evaluate and monitor:** Throughout the program, the Dell team collects data and monitors outcomes to help ensure that the program meets key milestones and the ultimate goals.

Because transforming teacher practices and enhancing student learning is a process and not a single event, school districts should regularly return to the assessment phase to identify the next professional learning opportunity.

**Encouraging active learning**

With one of the highest dropout rates in North Carolina, Edgecombe County Public Schools needed an innovative strategy to engage students and retain talented teachers. Find out how the district lifted test scores by up to 30 percent over one year, cut the dropout rate by 35 percent over three years, and reduced teacher turnover.

dell.com/k12/resources

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Mobile platforms open up a new world of Connected Learning

By Adam Garry and Casey Wilson

Are your students consumers or producers? How do they go about learning? As school districts map out a 21st-century curriculum, mobile computing platforms play a pivotal role in inspiring children to reach for the stars—with a bright educational outlook.

One are the days when teachers required students to flip the “off” switch before entering the classroom. The pervasiveness of computers in daily life and in the workplace is making technological fluency an essential aspect of school curriculum from the earliest grades. Access to information is critical to the learning process. Given a diverse mix of mobile devices to choose from, it is important to recognize the capabilities that empower learning both inside and outside the classroom.

Educators are already achieving breakthrough results by studying—and embracing—how children use personal technology in their daily lives. Technology engages students. It broadens the curriculum by allowing children to absorb and produce information according to their own learning styles and needs. It enables teachers to personalize learning for each student. And it supports dynamic communication and collaboration, enticing students to learn from each other and acquire valuable skills such as self-direction and critical thinking that will serve them well in their college and career decisions.

School districts are looking to invest in technologies that deliver the best educational outcomes and leverage existing investments for the lowest total cost of ownership. It is imperative that the vision for a digital learning environment be developed with the assistance and support of technologists, curriculum departments, education specialists, administrators, teachers, students, and parents to achieve the desired learning outcomes.

Many portals to the Connected Classroom

Instructional goals, student outcomes, student learning styles, student abilities, and the way students at different grade levels naturally interact with technology are key factors determining which types of computer learning devices to introduce into the classroom. Many devices excel in one area—for example, e-book readers are suitable for viewing but not authoring content. With limited technology funding, school districts may find that versatile mobile computers lead to the most productive student outcomes.

Netbooks: Compact and durable for content creation

Light and ultracompact netbooks designed specifically for education are an excellent way to introduce students to digital learning. The Dell™ Latitude™ 2120 netbook enables easy collaboration, quick connectivity, and simple access to digital content that expands learning horizons. Student-friendly design features include an extra-durable rubberized case, optional carrying handle, and optional tamper-resistant keyboard featuring antimicrobial protection. Up to 9.6 hours of battery life enable students to complete a full day of classes without recharging the netbook—and three customizable color options allow schools to show their colors.

To learn about an efficient way to store, charge, and centrally manage software updates for Dell Latitude netbooks, see the sidebar, “Teacher’s pet.”

Three optional anti-glare LED displays enhance the viewing experience with optional...
Teacher’s pet

Designed to charge up to 24 Dell Latitude netbooks at once, the Dell Mobile Computing Station 2.0 also provides an efficient way to centrally manage security and software updates. Wake-on-LAN capability allows the IT team to deliver updates remotely while the netbooks are locked up and charging. During the school day, a wireless access point with a rugged work surface puts the Mobile Computing Station at the head of the class.

Laptops: Powerful performers for complex applications
Appropriate for students who need heightened content creation and collaboration capabilities, laptops offer mobile, full-featured versions of powerful desktop computers. In particular, laptops support large, complex applications that are designed to run more efficiently on a local system than over the network, such as video editing software.

For example, the Dell Latitude E6520 laptop strikes a balance between mobility and performance for students with advanced computing needs. A 15.6-inch, anti-glare LED display with an optional dedicated video card makes this laptop an outstanding educational tool for students doing intensive graphics or video work. This third-generation E-Family laptop now comes standard with a numeric keypad on the keyboard, and offers an optional touch screen. In addition, the Dell Latitude E5420 laptop offers a 14.1-inch screen and rock-solid mobile performance.

Convertible tablets: Versatile presenters flip between slate and laptop
Designed primarily for content consumption, tablets are an exceptionally versatile category of devices that come in several varieties. Teachers and students often prefer tablets for tasks such as reading classic literature or reviewing notes.

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A productivity suite for unfettered creativity and collaboration

By running Windows® 7 together with Microsoft Windows Live® Essentials and Office 2010 suites on Dell Latitude and Inspiron systems, schools can equip students and teachers with a powerful set of educational tools. These learning platforms advance productivity, collaboration, and creativity in the classroom and beyond. Familiarity with these tools will also vest students with lifelong skills, given the pervasive use of Microsoft software in college and career venues.

Windows Live Essentials—which comes preinstalled at no extra cost on Dell Latitude netbooks, laptops, and tablets that ship with Windows 7—delivers a set of applications that inspire creativity and communication, from touching up photos and producing beautiful slide shows to connecting with others through e-mail, instant messaging, and social networks.

Photo and video editing tools let students and teachers create engaging, entertaining content with course material, while Windows Live Mesh keeps photos and documents in sync so groups and classes can collaborate easily. Microsoft Messenger supports access through virtually any tool—including mobile phones and Web browsers—helping classmates, teachers, and parents stay in touch. The Writer publishing tool encourages students to publish their own material on the Internet with a watchful eye on students’ online activities.

Office 2010 gives teachers and students helpful ways to stay productive and collaborative using the Microsoft PowerPoint®, Microsoft Word, and Microsoft OneNote® applications. In addition, this version extends the Office suite seamlessly from the desktop to the Web and to mobile devices with Web Apps—enabling collaboration, creativity, and learning to take place anywhere from a supported Web browser.

Complimentary classroom resources from Microsoft also help make lessons interactive and engaging. For example, Mouse Mischief integrates into PowerPoint 2010 and PowerPoint 2007, letting teachers insert questions, polls, and drawing-activity slides into lessons. Students can actively participate in these lessons by using their own mice to click, circle, cross out, or draw answers on the screen. For budding astronomers, WorldWide Telescope turns student computers into virtual telescopes designed to show images from the world’s finest ground and space-based telescopes.

FullFeatured convertible tablets like the Dell Latitude XT2 Tablet PC feature a hinge that lets users convert the device into either tablet or laptop mode. The touch screen allows input through fingertip or charged stylus. Coupled with a sleek, ultraportable design, these options make convertible tablets an excellent platform for tasks such as note taking, classroom evaluations, and projector-based lessons—as well as intuitive content browsing.

The Dell Inspiron™ duo convertible tablet provides a cost-effective alternative when robust full-featured laptop performance is not required. Its innovative design, with a single hinge that lets users flip the screen while keeping the bezel in place, makes the Inspiron duo a good candidate for classroom activities that emphasize both content consumption (in tablet mode) and content creation (in traditional clamshell mode).

For peak portability, the Dell Streak 7 is a pure slate device without a keyboard. The Streak 7 is an exceptional educational offering that features a 7inch touch screen and the Google Android™ 2.2 mobile technology platform, which is a Flash-compatible OS to make browsing, reading, and watching content easy. A forward-facing Webcam and a rear-facing 5.0 megapixel camera make the Streak 7 suitable for video chatting and live collaboration between students and teachers. Moreover, a shortcut to BrainPop—an animated Web site with a wealth of educational content—comes preinstalled on Streak tablets.

Focus on function

Determining the most appropriate mobile learning devices for students at different grade levels, and with different learning styles, is key when transitioning to digital content and collaboration technology in a Connected Learning environment. By carefully considering how the curriculum calls upon students and teachers to interact both with educational tools and with each other, schools can enrich the learning experience and enhance educational outcomes seamlessly and cost-effectively.

Adam Garry is the manager of Global Professional Learning at Dell and a former elementary school teacher. He consults in school districts across the United States on school reform, professional development, 21st-century skills, technology integration, curriculum and instruction, and leadership.

Casey Wilson is the K12 client field product expert on the institutional marketing team at Dell. Previously, he worked in the Student Computing Initiative.

Learn more

Dell Connected Classroom: dell.com/connectedclassroom

Dell K12 education: dell.com/k12

Microsoft classroom resources: microsoft.com/education/teachers

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Worcester Technical High School (WTHS) has a 100-year tradition as a trade school. Now, the school has made a new beginning in the way it prepares students for 21st-century careers. After building a US$90 million facility that includes its own restaurant, bake shop, bank, gift store, and print shop—all staffed by students—WTHS is open to the public for business.

The enthusiasm, motivation, and dedication to learning generated by this approach have affected student performance in academic subjects as well. “Since we opened the new facility four years ago, almost 40 percent of our students have raised their scores on the Massachusetts Comprehensive Assessment System exam,” says WTHS principal Sheila Harrity. “We have met our Adequate Yearly Progress goals of No Child Left Behind for four years in a row in English and math. We are one of only a few schools in the city to have done that.”

WTHS students are using technology to become more independent in their learning, and they are encouraged to make evaluative judgments about the information they find. This allows teachers to act more as facilitators and less as directors. “My students today are learning in a way that I never dreamed of learning,” says Robin Goodell, an instructor in the WTHS Telecommunications Department. “They’re on their computers, running simulation software, doing their lab work on their computers, accessing their curriculum on their computers.” And students are responding positively to having more resources for problem-solving. “Math isn’t my best subject,” says Alan Delossantos, a senior at WTHS. “But with technology and the way my teacher presents it, I’ve been able to get it faster and better.”

The technology behind this success comes from Dell. The school’s infrastructure includes Dell™ OptiPlex™ desktops and Dell Latitude™ laptops, along with Dell Precision™ workstations. The data center uses Dell PowerEdge™ servers running Microsoft® Windows Server®, Active Directory®, Exchange Server, and SQL Server® software.

The school is currently migrating to Windows® 7 and Windows Server 2008. It also recently upgraded to Microsoft Office 2007, and teachers use the Microsoft Office SharePoint® portal to organize their classes and grades. “We feel that the combination of Windows 7, Windows Server 2008, and as many Dell netbooks as we can get out there is going to create a situation where we can really make the access to applications more seamless and available,” says Goodell.

Dell’s technology, services, and training—including ongoing courses for teachers who use the technology—have made it an exceptional partner for WTHS. “Dell is making a major contribution to our students’ and our school’s success,” Harrity says. “Dell plays a magnificent role in the facilitation of the technology and in teachers’ professional development.”

Transforming the classroom with technology

WTHS is achieving exceptional outcomes in vocational and liberal arts education while revolutionizing the way students prepare for 21st-century careers. Find out how the school is using cutting-edge technology to make this happen.

dell.com/k12/resources

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Inquiring minds want to know—learning here, there, and everywhere

By Bob Moore and David Fritz

Tech-savvy students have already mastered the ABCs of mobile computing devices. But the question is, how can schools leverage these tools as learning platforms while providing secure access to educational resources anytime, from anywhere?

Today’s children live in a digital world. To educate this connected generation effectively, school districts must grant students seamless, secure access to all kinds of learning experiences—wherever they happen to be.

Using mobile computing devices that students and educators are already familiar with can be a good starting point. But a truly interactive Connected Classroom comes alive through digital content and collaboration technology, with seamless access from laptops, netbooks, tablets, and even smartphones—whether these devices are issued by the school or owned by the student. At the same time, districts must take stringent measures to help ensure the security of confidential student data and privileged school resources.

School districts can work with Dell to explore a wide variety of flexible, cost-effective alternatives for providing secure access to educational resources and collaboration tools.

Virtualize the desktop for anywhere access

Schools often provide access to specialized software and online information in computer labs—but limited staffing and physical locations mean that students can access computing resources only during class hours or when teachers are working. In addition, students may have to wait for computers during busy times, and specialized software may not be available in every location.

A desktop virtualization approach can help solve these access challenges. Using Dell™ Virtual Lab solutions, students and teachers can log in to any lab desktop that is virtualized, from whatever PC they happen to have, on or off school premises. As a result, they can access computer lab resources 24/7 and see their own desktop and files.

In addition, desktop virtualization helps reduce maintenance time and expenses by consolidating and centralizing computing resources. That means there is less hardware to break and fix. Centralized computing resources also help simplify security, imaging, and patching. Plus, Dell offers hosted Virtual Lab solutions to minimize the need for data center space in schools.

Centralize computing resources in a private or public cloud

Cloud deployments also offer a way to deliver secure, 24/7 access to educational materials and computing resources. Private clouds help cut technology administration costs by operating as a service installed on the school district’s servers, inside the school system’s network, and managed by centralized IT staff. Through the cloud,
students, teachers, and parents can remotely access applications, documents, assignments, and grades using any Internet-connected device.¹

Another option is Microsoft Live@edu, a public cloud offering K–12 institutions free hosted e-mail, communication, and collaboration services. Microsoft Live@edu gives schools access to hosted Microsoft® Outlook® Live e-mail with a 10 GB in-box and rich feature set, plus Microsoft Office Web Apps. An online companion to the Word, Excel®, PowerPoint®, and OneNote® productivity suite, Office Web Apps allow teachers and students to create, edit, share, and collaborate from virtually anywhere using Office documents from within a Web browser. In addition, Windows Live® SkyDrive® provides online file sharing, with 25 GB of complimentary online document storage.

**Protect private student information with Windows 7 security**

Regardless of which approach schools take to provide mobile access, confidentiality of student records is a top priority. In conjunction with Microsoft Windows Server® 2008 R2, Windows® 7 includes several key features that help ensure secure access from mobile learning platforms, whether students are in the classroom or on the go:

- **DirectAccess** connectivity avoids the step of loading and activating a virtual private network (VPN) by integrating this procedure into the remote access connection process. By supporting single sign-on, Windows 7 helps to streamline access so students and teachers can focus on educational content rather than connectivity issues.

- **Bit Locker™** drive encryption helps protect sensitive data from being accessed by unauthorized users if a school-owned mobile device is lost or stolen.

- **App Locker™** application control allows IT administrators to specify which applications and versions may be installed. This feature helps prevent students and teachers from downloading unauthorized software, which can inadvertently introduce application conflicts and malware. AppLocker also boosts efficiency by giving the IT team a single tool and interface for managing applications, and by helping reduce the number of application versions they must manage.

**Discover the world as your classroom**

Secure access to educational tools and digital content is the foundation for the Connected Learning environment. But enabling anytime, anywhere learning means schools must embrace mobile computing. Dell offers innovative technologies enabling secure remote access in mobile computing platforms such as netbooks, laptops, and tablets that have been purpose-built for education based on input from teachers and school administrators.²

As K–12 education transforms to meet the demands of the digital age, desktop virtualization and cloud deployments that have been purpose-built for digital content is the foundation for the Connected Learning environment. But enabling anytime, anywhere learning means schools must embrace mobile computing. Dell offers innovative technologies enabling secure remote access in mobile computing platforms such as netbooks, laptops, and tablets that have been purpose-built for education based on input from teachers and school administrators.²

As K–12 education transforms to meet the demands of the digital age, desktop virtualization and cloud deployments provide options for giving students, teachers, and administrators 24/7 access to digital content, computing resources, and collaboration tools while minimizing technology expenses. Flexible, purpose-built educational platforms and services from Dell—together with security and mobility features built into Windows 7—streamline connectivity and safeguard privileged student information and school resources.

¹To learn how a real-world private cloud deployment allows students at Worcester Technical High School to access the learning environment on and off campus, see “Worcester Technical High School helps students raise grades and test scores with help from Dell and Microsoft,” dell.com/downloads/global/casestudies/2010-worcester-ths-10008451.pdf.

Keeping IT simple helps teachers stay focused on the digital lesson plan

By Ilan Dar

Connected Learning environments call for effective digital content and systems management across a diverse mix of computing devices. Dell KACE™ Appliances boost management and service-desk efficiency to maximize learning time as well as cost-savings.

Embracing a digital curriculum means embracing digital content—in many different ways, shapes, and forms. To support a media-rich, blended learning environment, schools need an efficient way to manage educational materials and systems. The goal: ensure reliable, secure access to digital content from any device—without adding to the IT staff or overburdening data center resources.

Simplifying digital content management advances educational goals by making classroom resources easy to organize and use. And simplifying management of heterogeneous systems advances educational goals by enabling seamless, secure mobile access to the digital learning environment—avoiding disruptions to teaching and learning processes inside or outside the classroom. At the same time, effective management of digital identities is of the utmost importance.

Many school districts planning the transition to a digital curriculum may be concerned that they lack the requisite IT resources to manage a digital learning environment. However, the right management tools can help by heightening IT efficiency even as the staff supports a burgeoning mix of digital content, digital identities, personalized devices, operating systems, and applications. In addition, automating and centralizing routine systems management functions accelerates service-desk response time. Allowing IT staff to quickly resolve any technology glitches helps schools avoid disruptions in learning time and keep the classroom experience focused on education.

Embracing digital diversity

IT support challenges have intensified as personalized devices parade into the classroom, carrying digital learning materials along with the non-compliant software that students and teachers may download. To maintain the security and integrity of school systems, IT needs visibility into everything that is connected to the network—from school servers and storage to laptops and smartphones owned by students, teachers, and administrators.

Digital asset inventory is a critical first step toward achieving that visibility. Dell KACE Management Appliances—integrated systems management tools that are available in either physical or virtual versions—are easy to install,
Energy conservation leads to big savings

Gaining control of an expanding technology footprint isn’t the only concern for school districts supporting a digital learning environment. Dell KACE Management Appliances also help reduce the cost and amount of energy needed to power the supporting IT infrastructure and cool facilities.

For example, the Antioch Unified School District (AUSD) IT team in Antioch, California, manages 4,200 endpoints in 24 different schools. Using the Dell KACE K1000 Management Appliance, AUSD’s IT team determined that about 800 computers were left on overnight. The appliance then enabled the school system’s IT team to create and push out a simple script to shut down at 7 p.m. each night all but 16 computers, which were used for routine maintenance jobs. This simple change helped AUSD significantly lower utility bills and qualify for a onetime rebate from the local utility totaling more than US$60,000.

A+ for service-desk management and seamless scalability

Colorado Springs Academy School District 20 aced the systems management test for inventory tracking, service-desk processes, and maintenance of a mixed PC OS environment using Dell KACE Appliances. Find out how the large K–12 district saved more than 15,000 hours of IT labor annually while cutting end-user downtime by 50 percent.

Ilan Dar is the product manager for the K1000 product line at Dell KACE. Prior to joining Dell, Ilan was director of engineering at Sybase, where he oversaw the development of mobile messaging and advertising services products.

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How wireless networking enables a mobile learning environment

By Abraham Ghebremicael

Fast, reliable access to digital tools and content fosters student engagement and keeps learning time productive. Dell™ PowerConnect™ W-Series wireless network platforms offer high-performance connectivity that is easy for the IT staff to manage.

The increased use of wireless devices in K–12 schools creates an exceptional opportunity to improve student engagement and mobility of the teaching environment within a school campus. The integration of audio, video, and graphics animation, coupled with interactivity, enables new teaching paradigms that expand the learning experience for all students. In addition, the Internet and other communication networks open access to a plethora of information that takes students well beyond traditional classroom resources.

Dell PowerConnect W-Series wireless network platforms, based on the 802.11n standard, are designed to enable seamless mobility and reliable network access to digital tools and content—while simultaneously meeting district requirements for security, scalability, and cost-effective deployment and operation. These wireless solutions provide an easy-to-manage network for IT staff that allows reliable, high-performance connectivity for students, teachers, and administrators throughout the Connected Learning environment.

Getting wireless networks up to speed

As K–12 school districts explore ways to give students and teachers free-ranging access from mobile devices to digital resources, each other, and the Internet, it is a critical planning consideration to ensure that the supporting wireless infrastructure is up to the task. The advent of the 802.11n wireless networking standard has accelerated the shift from wired to wireless as the preferred access method in classrooms and across districts (see Figure 1).

PowerConnect W-Series 802.11n network platforms enable a variety of benefits over previous wireless technologies:

- **Improved capacity and performance:** The 802.11n standard allows significantly increased data rates compared with previous standards, enabling students and teachers to take advantage of high-speed access to rich multimedia content.

- **Increased range:** Multiple-input, multiple-output (MIMO) techniques in 802.11n accelerate the connection rate for a given range and extend the range at the edge of a cell. This extended range can help IT personnel design networks that allow the entire school to serve as a single mobile learning environment.

- **Enhanced reliability:** Wireless network coverage can often be spotty, and even small changes in the environment or device placement can have a large impact on performance. By allowing multiple antennas to work together effectively to maintain the original signal, 802.11n MIMO technology helps dramatically reduce this problem. As a result, it helps ensure that students and teachers keep a reliable signal even as they move across the network.

- **Reduced costs:** The cost of connecting users with a high-speed wireless connection is typically far less than the cost of wiring each
individual device, as are the costs associated with power, cooling, and management. Moreover, in a homogeneous 802.11n-based network, the enhanced range and reliability allow access points to be spaced farther apart than they could be otherwise. The combination of lower installation costs and fewer indoor and outdoor access points can help significantly reduce overall network costs.

**Enabling classroom connectivity with the Dell PowerConnect W-Series**

Dell PowerConnect W-Series access points and controllers, along with the Airwave Wireless Management Suite (AWMS), can help district IT personnel effectively deploy and manage 802.11n-based wireless networks to create a seamless Connected Learning environment. PowerConnect W-Series wireless network solutions are designed to meet the specific performance and productivity needs of K–12 campuses ranging from just a few classrooms to large school districts. Because they can be centrally managed, PowerConnect W-Series wireless network solutions enable IT staff to avoid manual configuration and utilize automatic software updates. This approach helps reduce management time and costs for network administrators.

The PowerConnect W-600 and PowerConnect W-3000 controller series provide wireless management and access suitable for different environments. The PowerConnect W-600 Series is designed for relatively small networks, enabling quick deployment with minimal IT staff presence or experience while offering a balance of features and value. The PowerConnect W-3000 Series is designed for medium and large networks that need high levels of performance, reliability, and security. Both series support optional feature modules that extend and enhance core security features.

The AWMS is a comprehensive suite of easy-to-use management options for PowerConnect W-Series network solutions, enabling simplified control while allowing IT personnel to quickly expand networks and reduce the disparate tools needed to support them. It includes a mobile device manager that monitors and offers a single view of all devices on the network, as well as wired-equipment configuration and reporting.

**Facilitating interactive learning and collaboration**

The widespread use of personalized computing devices—together with the need for mobility and flexible access—make wireless networking an optimal choice for many K–12 learning environments. By enabling the deployment of high-performance, reliable, and secure 802.11n-based networks that can support a wide range of bandwidth-intensive multimedia applications, Dell PowerConnect W-Series wireless network platforms can help district IT personnel foster interactive learning and collaboration. In addition, they enable teachers to track progress in real time as students engage with their digital learning community.
The data dilemma: Containing an expanding universe of digital content

By Keith Price, Greg Tan, and Paul Koteras

Connected Learning calls for digital content, and lots of it. Schools need a storage strategy that can cost-effectively manage data growth, ensure security and compliance, and streamline access to all kinds of information—whether created by or for students.

Content creation has always been an important part of the learning process in schools. Now that the digital age is here, students are taking quantum leaps beyond writing reports in simple word processing programs. They are demonstrating mastery of concepts and information by creating interactive presentations, producing dynamic videos with special effects, and building banks of knowledge through wikis and forum discussions.

Meanwhile, teachers are leveraging technology to reach students in surprising new ways. For example, innovative educators are incorporating video, interactive games, simulations, online collaboration, and much more into their lesson plans.

These new shapes and forms of content delivery give schools an exciting range of options to address individual learning styles. At the same time, the onslaught of digital information in Connected Learning environments makes intelligent data management a pressing concern as students and teachers author an unprecedented amount of digital content day after day.

To successfully support the emerging digital curriculum model, school districts must ensure that their IT infrastructure is designed to store, organize, and provide secure access to vast amounts of unstructured, object-oriented data encompassing e-mail, graphics, images, and video—all within flat or shrinking budgets.

As the volume of digital content grows unchecked, school IT teams are facing some tough challenges. Regulations regarding how long, how securely, and how accessibly data must be stored mean that school districts need ways to manage information cost-effectively throughout its life cycle. They need a reliable process for data backups and restores. They also need ways to classify data according to its use, value, and compliance requirements—and the ability to search this data and find what they need quickly.

Many schools have begun to tackle the problem of data management by adding increasing amounts of disk storage to their data centers or cobbling together several point solutions, each with its own management interface. However, ad hoc quick fixes are not a suitable long-term answer. Many districts do have a retention policy that covers how long they store student records—but many of those records are not accessed very often, and storing them on tier 1 disk media can be an expensive
proposition. Instead, schools need an intelligent data management approach that allows them to prioritize, preserve, and protect digital content simply and cost-effectively.

**Best practices for digital content management**

Dell is helping school districts tackle data growth challenges with products, services, and partnerships designed to manage data from the time it is created through the point when it is deleted permanently. In Dell’s vision, the components that perform these individual functions should be designed to work together seamlessly, with no silos that would make data migration a complicated task involving manual intervention.

The comprehensive Dell™ Intelligent Data Management (IDM) strategy enables IT teams to manage exploding data volumes easily and cost-effectively. This approach encompasses five key areas: growth planning and analysis, data protection, archiving and retention, e-discovery and compliance, and optimization (see Figure 1).

**Step 1: Analyze storage requirements and plan for growth**

The first step in the process is to evaluate the school district’s current storage approach and growth expectations within its existing IT environment. School technology leaders can perform analysis using manual tracking and predictive analysis or storage resource management software. Storage assessment consulting and managed services also give schools options for leveraging outside expertise.1

**Step 2: Protect important data**

Schools should protect online lessons and classroom-generated content by storing multiple copies of data to traditional disk- or tape-based archives using backup software. Virtual tape libraries offer disk-based devices that emulate tape drives—combining the rapid access of disk media with the low costs associated with tape drives.

**Step 3: Archive data for long-term retention**

Information that schools have to store for a long time—such as past student records—generally does not need to be accessed very often. Moving this data from relatively expensive primary storage onto low-cost media (such as tape-based archives) helps district IT departments dramatically cut their storage costs. It also helps IT staff effectively manage the data that educators do need to access frequently, like lesson plans and classroom materials.

In addition, automating the process of moving data among storage tiers helps schools avoid multiple failure points and human intervention—which tend to increase the risk of data loss. Tiered storage lets IT staff retain the ability to access priority data quickly when they need it—as well as manage the deletion or destruction of data at the end of its life cycle so schools do not waste money storing content they are no longer required to maintain.

**Step 4: Create indexes and classifications to support e-discovery and compliance**

E-discovery can be time-consuming and expensive for school districts that don’t have systems in place for classifying and retrieving the data they store. Traditional approaches to compliance and e-discovery often are reactive, manually intensive, and ultimately ineffective. An IDM approach helps schools address these problems with robust data classification and policy-based rule engines for efficient, compliant content retention, search, and discoverability.

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Flexible storage options for growing data volumes

The Dell Intelligent Data Management (IDM) strategy maps out a comprehensive, tiered approach to help simplify storage administration, optimize performance, and minimize IT costs for content-rich digital learning environments.

- **Tiered storage approach:** Dell storage platforms include Dell EqualLogic™ PS Series Internet SCSI (iSCSI) storage area network (SAN) arrays, Dell PowerVault™ MD Series iSCSI SAN arrays, and Compellent Fluid Data unified storage architecture platforms. In addition, Dell offers a versatile range of network attached storage (NAS), direct attach storage (DAS), and tape library offerings. This broad-based approach helps schools create tiered storage systems that keep frequently accessed data on high-performance storage arrays and move secondary data to less expensive storage media.

- **Object-based storage management:** The Dell DX Object Storage Platform is suitable for a plethora of applications, ranging from Web publishing to archiving. This object-based storage offering helps school IT administrators provide intelligent access, storage, protection, and distribution of unstructured digital content including graphics, video, images, instant messages, and e-mail.

- **Integrated disk-based backup:** The Dell PowerVault DL2200 Backup to Disk Appliance – Powered by CommVault or Symantec helps schools manage and protect information at multiple points in its life cycle. Automated dynamic disk-provisioning features are designed to configure disks without manual intervention, and integrated support for tape libraries facilitates off-site storage for disaster recovery.

- **Flexible growth and upgrade paths:** Dell EqualLogic and Compellent Fluid Data storage platforms are designed to help schools avoid a rip-and-replace approach to upgrades while creating a cost-effective foundation for 21st-century infrastructure technology such as virtualization and the cloud. Advanced automated tiering and storage management with built-in data management intelligence help optimize disk price/performance and reduce the cost of expansion. In addition, perpetual software licensing helps ensure continuity and automate online change management as the infrastructure grows.

For more information on Dell data storage and backup options, visit dellstorage.com.

across disparate systems and media types. Object-based and metadata-aware storage allows IT administrators to identify and retrieve information quickly.

**Step 5: Optimize server and storage configurations to minimize costs**

Taking an IDM approach is an ongoing process. Deduplication technologies help schools optimize their data centers for long-term cost-savings by reducing their data footprint and eliminating extra copies of redundant data. Energy-efficient solutions and arrays help cut power usage and costs. Automated, policy-driven data migration tools, virtualized storage, and integrated deduplication capabilities streamline capacity scaling and help minimize costs. Server and storage virtualization also let IT staff consolidate multiple workloads onto individual physical platforms, which helps save data center space, reduce the need to buy additional hardware, and cut power and cooling requirements.

**Proactive storage strategy for 21st-century digital curriculum**

While Connected Learning environments open exciting new doors for students and educators, they also generate an enormous volume of digital content. By proactively planning an IDM strategy to support digital learning initiatives, IT teams can prepare for growth, storing structured and unstructured content securely and cost-effectively. Advanced automated tiering and storage management help ensure fast access to priority data—optimizing server and storage resources while meeting compliance requirements for e-discovery and archiving.

Keith Price has 16 years of experience with K–12 technology integration. He has worked closely with students, teachers, principals, and district administrators to help ensure that technology resources support teaching, learning, and organizational activities effectively and efficiently.

Greg Tan is a solutions marketing manager at Dell. He focuses on helping K–12 school districts build their infrastructure to enable the Connected Learning environment.

Paul Koteras is a server and storage product marketing specialist at Dell. He has 10 years of experience in the IT and support fields and volunteers to assist schools with technology implementation plans.

Learn more

- Dell K–12 education: dell.com/k12
- Dell Intelligent Data Management: dell.com/datamanagement
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