

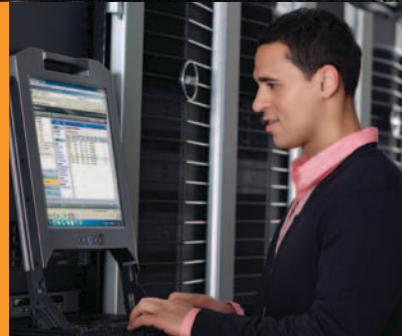
Next Generation Learning

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2012 Issue



Empowering educators,
inspiring students



- ➔ Smart investment: Transform education for a new generation with integrated digital learning resources and professional learning services
- ➔ Unfettered potential: Revolutionize the lives of students with special needs using assistive technology from Dell and Intel
- ➔ Oceans of knowledge: Flexible, secure, and cost-effective access to digital education content with Dell Fluid Data-based storage
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Transforming education for a new generation

As we visit with educators around the world, we are struck by the sense of urgency each leader has to transform the teaching and learning experience. Technology plays a critical role in this transformation, and we understand that you are counting on education technology partners to provide the tools and resources you need to create the next generation of learning. In this digital age, educators are envisioning learning that is personal, collaborative, and focused on building the critical skills necessary for students to compete in an increasingly competitive global economy.

That's why we have a dedicated team of specialists offering many years of education experience at the school and university level. These specialists work with educators around the world, Dell technology experts, and other industry leaders like Intel to develop the tools and applications required to support a robust Next Generation Learning environment.

The right tools provide actionable data that administrators, teachers, students, and parents can use to develop effective teaching

and learning strategies. Integrated learning platforms based on field-tested technology from Dell and Intel enable educators to treat each student holistically, personalizing the curriculum to drive success. Ongoing professional learning helps ensure that teachers have the confidence and skills to incorporate new technologies into every aspect of the teaching and learning environment—technologies they can leverage to gain needed efficiencies. And we continue to expand technology options to help meet every student's individual needs. Why? Because it is critical to encourage students of all ages to reach their full potential.

Every day we are inspired by your commitment and aspirations, and we truly listen to and invest in what you tell us you need. We hope you enjoy reading about the innovations we cover in this publication and understanding how they can help you achieve your education goals. And we look forward to an ongoing dialogue on how we can continue to better serve you in accomplishing your mission to improve educational outcomes and career readiness for every student.



Mark Horan
Vice president and general manager,
K-12 education
Dell



John Mullen
Vice president and general manager,
higher education
Dell



Empowering educators, inspiring students

By Bob Moore and Jon Phillips

Schools and universities now have a remarkable opportunity to transform education for a new generation. Integrated digital learning resources and professional learning services make it easy to tailor curriculums and monitor progress to help students shine.

Educational institutions are at an important juncture. The road ahead is one of information abundance—and transforming K–20 curriculums to embrace this new reality is necessary to prepare students for the information-driven economy of the future. By collaborating to define a vision for Next Generation Learning and delivering on that vision through a highly integrated digital learning platform, educators, administrators, and IT decision makers can accelerate the journey.

At the outset, educators are facing some complex questions. What is the best way to blend online and offline content and integrate formal and informal learning? How can schools support an anytime, anywhere learning experience? How can teachers and instructors incorporate and encourage social and collaborative experiences within the learning environment? And what can schools and universities do to harness the power of learning analytics and become more proficient at fostering successful student outcomes?

As educators begin exploring these issues, common goals paint the picture of a highly integrated educational landscape, rooted in a unified digital learning platform with an intuitive interface tailored specifically for educators, students, parents, and administrators. This industry-leading Next Generation Learning platform, based on Intel® technology, helps schools and universities streamline access to core educational applications—both new and existing—as well as rich media resources, education and operational data, and curriculum management tools. Integrating student information and teaching and learning data with predictive analytics also enables educators to monitor progress and tailor course content to meet individual student needs.

Professional learning is a key enabler for Next Generation Learning initiatives, helping educators to transition effectively from print to digital learning environments and to personalize the educational experience for individual students. It can include targeted training to incorporate digital collaboration tools, student engagement techniques, and teaching and learning data into daily teaching practices.

An Efficient IT framework plays a pivotal role in helping educational institutions support these initiatives. After years of budget cuts, schools are operating at a “new normal” level of reduced funding. At the same time, however, Next Generation Learning environments heighten demands on network bandwidth, IT security, system availability, and storage. To meet these demands, schools and universities are exploring innovative ways to drive productivity and enhance accountability. They are finding that a focused vision for learning coupled with an Efficient IT strategy is fundamental to the undertaking.

Rather than attempting to solve complex problems with short-term, ad hoc fixes, schools and universities need to take a comprehensive approach. By leveraging their existing technology investments, institutions can map out a clear, customized path of transformation to achieve their educational goals. The Dell

strategy empowers K–20 educators and administrators to address these challenges by encompassing three principal areas:

- Embracing technology to inspire student success and academic excellence
- Providing accurate, actionable education data to make proactive teaching and learning decisions
- Building an Efficient IT infrastructure to support Next Generation Learning initiatives

Inspiring student success and academic excellence

Dell helps K–20 institutions drive student success by delivering Next Generation Learning platforms, powered by Intel. Dell™ learning platforms empower educators to personalize the curriculum and enable blended learning environments that help students engage in the educational experience anywhere and anytime. By leveraging synchronous and asynchronous instruction and collaboration, blended learning environments offer an accepted, effective method for extending and enhancing instruction beyond the physical classroom. This approach helps schools at all levels respond to increasing capacity demands and reach more students than is possible with traditional classroom methods.

Dell Next Generation Learning platforms provide easy access to digital content—including video and audio materials, instructional games, digital assets, simulations, and collaborative and research tools—that enables students to work at their own pace and learn in ways that appeal to and motivate them. In addition, the Dell learning platforms give teachers and administrators efficient ways to gauge the success of the learning experience and proactively manage learning outcomes through education data management and effective analytics tracking.¹

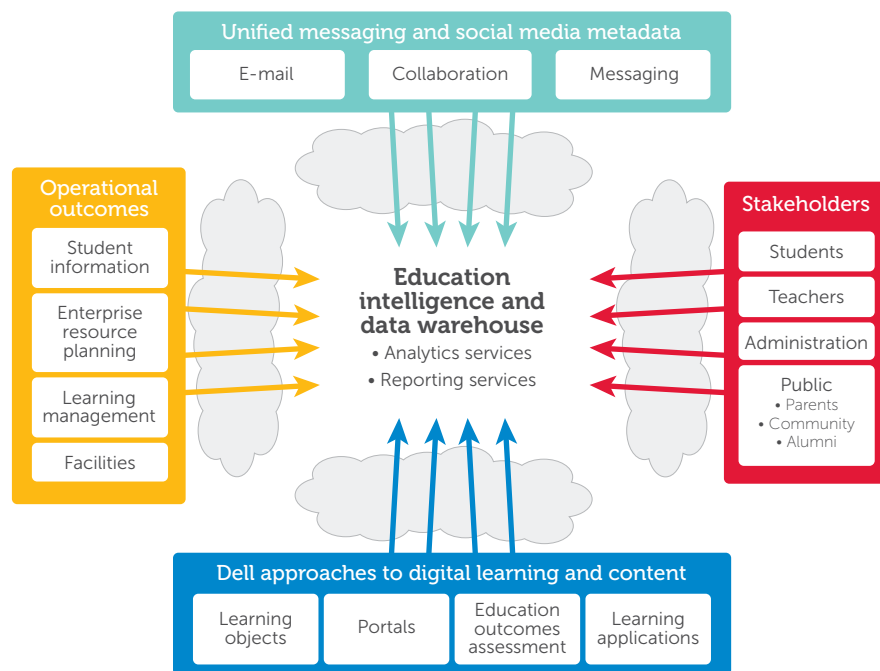


Figure 1. Turning data from a variety of learning applications, operational systems, and student communication systems into effective information for enhanced decision making

These technologies both require and enable effective professional learning for teachers, administrators, and staff. Preparing K–20 students for career readiness in today’s world calls upon educators and administrators to effectively integrate technology into their daily teaching practices.

To help accelerate the transition to blended learning environments, educators can take advantage of professional learning designed to help them optimize the use of available technologies. The Dell Professional Learning Services team works with educational institutions to develop customized, outcome-based learning programs that mix one-on-one instruction, coaching and modeling, and sharing sessions for teachers and faculty.

Providing accurate, actionable education data

Today, virtually every aspect of teaching, learning, and administering the educational system generates data (see Figure 1). Using

this information effectively empowers schools to personalize learning, enhance accountability and transparency, and inspire student success by pinpointing effective teaching strategies and interventions. In addition, access to accurate, actionable education data from a variety of sources helps educators better manage the learning environments and develop curriculums that help individual students overcome specific stumbling blocks to their learning process.

Comprehensive education data management also allows educators to deploy real-time learning analytics and predictive intelligence to help proactively address any challenges to student success and academic achievement. This information helps to increase operational efficiency and assist educators with quantitative input to better measure classroom and/or courseware success.

Dell helps align classroom and operational decisions with learning

¹ For more information on creating an effective digital learning platform, see “Creating a springboard to student success,” by Adam Garry and Jon Phillips, in *Dell Power Solutions*, 2012 Issue Next Generation Learning special edition, content.dell.com/us/en/enterprise/d/business-solutions-power-en/documents-ps1q12-cl-20120162-platforms.pdf.aspx.



objectives by providing tools designed to help educators and administrators understand their environment and develop plans based on accurate information. Dell Education Data Management (EDM), powered by Intel technologies, offers an integrated information management system for educational institutions that is designed to transform high-quality data into actionable knowledge.² It helps improve educational outcomes and allows educators to follow student information over multiple years, across multiple schools, between organizations, and even into the workforce.

Building an Efficient IT infrastructure

An Efficient IT approach helps educational institutions optimize services for students, educators, and administrators by making accurate, comprehensive, and consistent information available across all district and campus systems. This approach also helps schools and universities scale effectively to meet growing demands despite limited resources and budgets.

By using analytics to enhance success in communications and interactions with stakeholders, higher education providers can improve response rates throughout the admissions and fund-raising processes. Streamlined data handling helps eliminate manual processing of duplicate or overlapping records and supports security and regulatory compliance by feeding clean, consolidated, constituent data to identity management systems.

Dell supports educational institutions with a tightly integrated approach that encompasses industry-standard technologies such as interconnectivity, servers and storage powered by Intel processors, open source and commercial operating systems, and systems management tools and software. A Dell IT simplification assessment is an

excellent first step toward building an Efficient IT infrastructure. This assessment helps an organization develop the appropriate implementation plan to prepare for a successful deployment. A Dell IT simplification assessment assists with the evaluation of current IT (as-is) operations in the district or institution. It includes collection of discovery, financial, and qualitative data; effective rating of a customer's complexity; calculation of cost; and assesses the overall current condition of the IT infrastructure. Specific findings and recommendations based on best practices are presented to the district or educational institution to help it develop and prioritize a road map for initiatives designed to reduce complexity and maintenance spend. Alternative hosting models for off-premises IT also promise to boost IT efficiency in education. For example, many colleges and universities are already moving a variety of services to the cloud (see Figure 2). Potential advantages of leveraging cloud computing in educational institutions include the following:

- **Cost:** Schools can opt for a subscription or, in some cases, a pay-as-you-grow plan—as suits the institution's model.
- **Flexibility:** Cloud computing allows schools to scale their infrastructure dynamically as demand fluctuates.
- **Accessibility:** Cloud computing provides options to help shift workloads to hosted environments and reduce costs through services without jeopardizing the security of sensitive information.

Extending learning beyond the classroom

As mobile learning environments become prevalent, students need technologies that enable secure, seamless access to many different kinds of educational experiences. Dell offers a range of mobile computing approaches for education, from netbooks and tablets to laptops and classroom docking carts—all powered by Intel. Dell offerings also enable secure, cost-effective student access to learning resources using personal devices. In addition, Dell helps schools boost security by creating

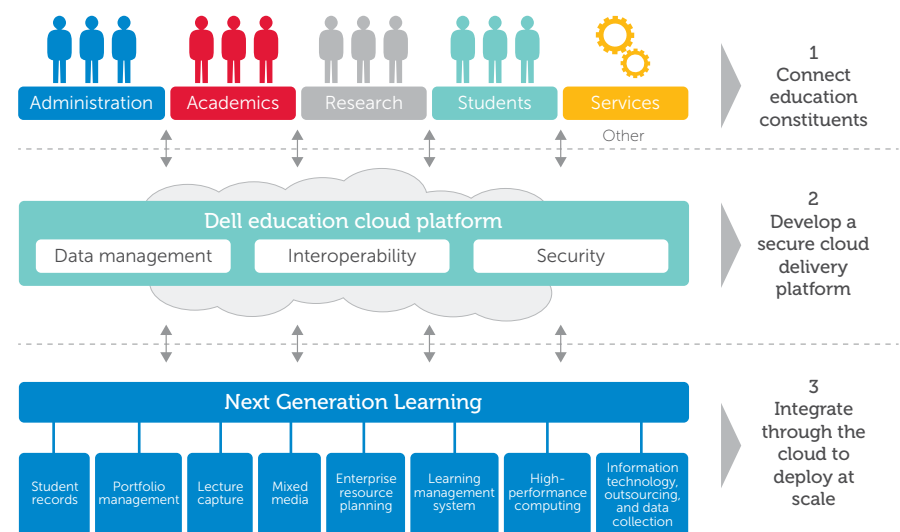


Figure 2. Transforming IT for education through cost-efficient, flexible cloud resources that support instruction, collaboration, and program evaluation

² For more information on Dell EDM, see "Drawing fresh insights from a new world of learning opportunities," by Donna Boivin, in *Dell Power Solutions*, 2012 Issue *Next Generation Learning* special edition, content.dell.com/us/en/enterprise/d/business-solutions-power-en/documents-ps1q12-cl-20120165-datamgmt.pdf.aspx.

Preparing students for social and economic success around the globe

Countries worldwide share the common goal of a vibrant economy sustained by quality, relevant education that prepares a skilled workforce for innovation and growth. Intel is helping to turn this vision into reality by collaborating with governments, policy makers, and Dell to transform education.

Intel works to foster the digital literacy, problem-solving, critical-thinking, and collaboration skills that students need to

succeed in the digital age. The company has invested over US\$1 billion and close to 3 million employee volunteer hours to help improve teaching and learning environments in over 70 countries during the last decade.

Learn more about Intel initiatives to support Next Generation Learning and prepare students for sustainable social and economic success at intel.com/intel/education.

centralized data storage, so mobile devices function only as an access point.

Technology can also transform the educational experience by helping individuals with special needs to communicate, access information more easily, or provide a voice. However, successful deployment of assistive technology can be complex because each solution must be custom designed and built to meet the requirements of the individual student. Working with strategic partners, the Dell Assistive Technology Service, developed in collaboration with Intel, offers a comprehensive approach that allows schools and service centers to acquire technology items through a single purchase order and delivery.³ A dedicated Dell education specialist works with K–20 institutions throughout the ordering, delivery, implementation, training, and support processes to help ensure that both students and educators get the devices and training they need to enhance the learning experience.

Transforming education for Next Generation Learning


Through co-development with other education technology leaders such as Intel, Dell is committed to helping educators define their vision for Next Generation Learning.

The company's approaches to education focus on inspiring student success and academic excellence, making real-time decisions based on accurate education data, and building an Efficient IT infrastructure to support learning initiatives. (For more information, see the sidebar, "Preparing students for social and economic success around the globe.")

Transforming education to embrace interactive digital learning is not a books-on-tape approach but a tremendous opportunity for K–20, and institutions can benefit significantly from working with a knowledgeable technology partner. Making systemic changes to the education system requires a holistic view. Dell offers not only technology expertise, but deep education experience.

Dell has committed thousands of hours to testing and validating architectures that help take the guesswork out of deploying digital learning platforms. Dell also extensively tests popular higher education applications on Dell infrastructure in lab settings to help ensure it can support educational institutions in virtualizing common specialty applications.

These efforts have translated into custom learning platforms that blend on-premises and off-premises learning applications, mobile access, single sign-on capabilities,

and support and managed services. And most important of all: the collaboration has resulted in an industry-leading Next Generation Learning platform designed to improve student outcomes and enhance career readiness. 

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³To learn more about the Dell Assistive Technology Service, see "Unlocking the potential of all learners," by Kelli Hodges, in *Dell Power Solutions*, 2012 Issue *Next Generation Learning* special edition, content.dell.com/us/en/enterprise/d/business-solutions-power-en/documents-ps1q12-cl-20120167-services.pdf.aspx.



Launching an effective digital content strategy

By Kelli Hodges

Digital content is at the heart of Next Generation Learning, and educators can choose from a dazzling array of rich media resources and interactive options. How can they find the best digital assets to personalize learning and help ensure success?

The digital world is woven throughout the daily lives of today's students. In fact, using technology is so natural for this generation that asking students to turn off their devices when they come to school is counterproductive. With such a wealth of resources available, educators have opportunities to effectively engage students and get immediate feedback by tailoring digital content to personalized learning objects empowered by core Intel® technology. The ability of educators to truly select the appropriate digital asset to meet the learning outcomes of students is often a struggle for teachers.

Next Generation Learning embraces many different types of digital content

to help personalize learning for students, including video and audio; instructional games and simulations; Web 2.0 features such as collaboration and quiz tools; publisher digital assets such as textbooks, workbooks, and reference books; and open educational resources such as student- and teacher-created content.

Educators are eager to understand how to use digital content effectively to facilitate the learning for each student. Simply replacing printed textbooks with digital book readers does little to transform the educational experience for today's learners. Instead, digital content should focus on learning objects—thereby empowering educators to select the most

suitable objects to personalize learning and optimize student outcomes. In addition, schools and universities should invest in professional learning to help ensure that educators are prepared to use digital content effectively in their courses. (For more information, see the sidebar, "Teaching the educators.")

Setting a baseline

The first step toward transitioning to a digital content model is to assess the current content inventory and policies. That assessment explores illuminating questions such as, What is the comfort level of the educators with the integration of digital content into their instruction? What is the

Teaching the educators

Professional learning is a critical component of any digital content strategy. Giving educators the tools and knowledge they need to use digital resources to best advantage enhances the learning experience for students. As part of its Professional Learning Services, Dell works with educators to identify three categories of professional learning:

- **Experiences:** Exploring new learning tools and teaching methods can provide background and context but is not intended to change teaching practices or affect student learning.
- **Training:** Executing activities, including successfully using a fresh application, technology, or teaching method in the

classroom, can change teaching practices—but the training does not affect student learning.

- **Professional development:** Engaging in a process-based approach impacts daily teaching practice and student success.

Working with Dell education specialists, institutions can use this conceptual framework to create customized plans that help educators effectively integrate technology into the classroom and accelerate student success. To learn more, visit dell.com/professionallearning.

Digital assets to inspire learning

The Dell Digital Adoption Resource Tool utilizes the power of Intel technology for innovative access to personalized learning that enables teachers, students, parents, and administrators to find and share open education resources provided by Dell partners.

digitaladoptionresource.com

current inventory of content, both traditional and digital? How is any existing digital content being used, and by whom? What is the policy around students taking online courses from outside providers? What types of digital devices can educators and students already access, both at school and at home? What delivery systems are being used for existing digital content?

By considering the current state of digital resources and the goal to improve student outcomes, educators can identify and fill content gaps. Together, students and teachers can create and consume high-quality digital content empowered by Intel technology for their own learning resource repositories.

Establishing a strategy

Once the starting point is defined, K–20 schools can begin creating a plan to implement and manage digital content. At every step of the planning process, appropriate access to digital content is essential for students and educators, and educators and administrators should have the tools and knowledge they need to assess student learning and provide feedback.

At this stage, educators should identify instructional objectives that the digital content strategy supports and align digital content with state and national standards. To do this alignment, they must fill any gaps within the existing digital content library. The Dell™ Digital Adoption Resource Tool, powered by Intel, helps simplify this process by providing a vehicle for teachers, parents, and students to search, find, and share digital assets. This tool

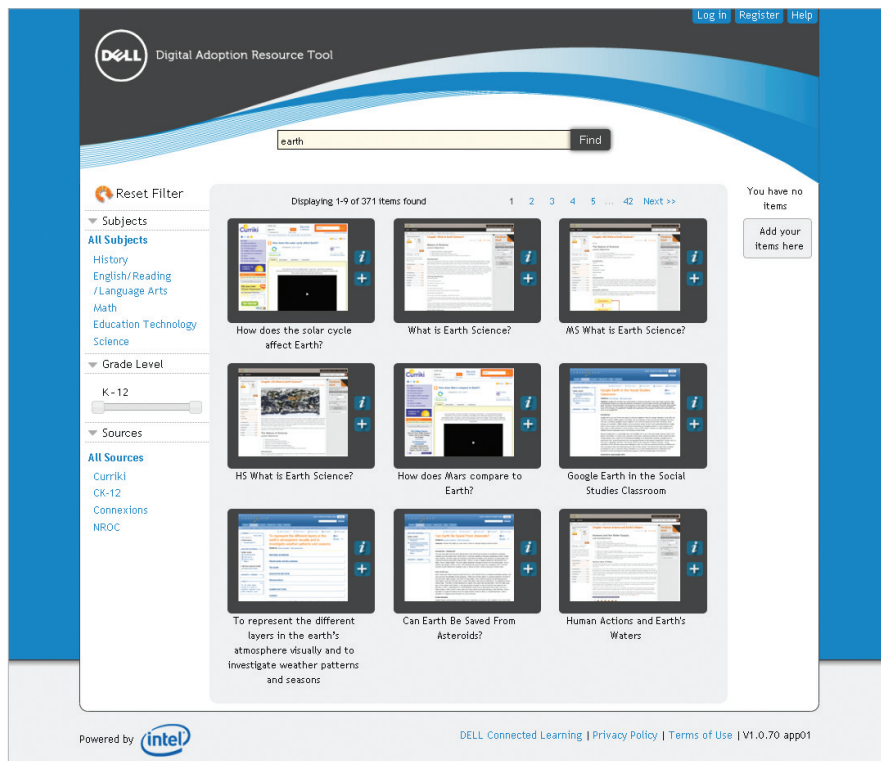


Figure 1. Web browser–based Dell Digital Adoption Resource Tool, powered by Intel

provides a first step for the transition from print to digital resources (see Figure 1).

Once the desired learning outcomes are established, educational institutions craft an IT strategy to support them. Key considerations include the following:

- **Access:** Students and educators require broadband access and wireless connectivity to use digital resources effectively.
- **Security:** A plan for protecting confidential information about students, educators, communications, and progress should be created and implemented.
- **Data management:** Schools and universities capture and manage student work produced in the learning environment.
- **Standardized device configuration:** Every device that accesses the district or school network should meet the same requirements for capacity and applications. Standardized configurations also make devices easy to manage and service.

Transitioning to a digital content model

Collaborating with Dell to integrate digital resources into the curriculum enables educators to leverage a unique combination of education and technology expertise. Dell employs a specialized team of former educators who can provide guidance and support for schools as they transition to a digital content model. Dell also partners with select providers to deliver access to digital content resources and platforms. **PS**

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Kelli Hodges is the strategic alliance manager for the Dell Global Education team. She has more than 21 years of experience in education, including the special education, digital content, and implementation areas.

Learn more

Digital content:
dell.com/digitalcontent

Instructional technology:
dell.com/k12/instructionaltech



Creating a springboard to student success

By Adam Garry and Jon Phillips

In the transition to a digital learning environment, K–20 institutions can adopt an engaging platform that integrates diverse learning tools to help personalize the student’s experience, enable collaboration, and accelerate digital content adoption.

Educators around the world are responding to the opportunities of the digital age by creating innovative new teaching and learning experiences.

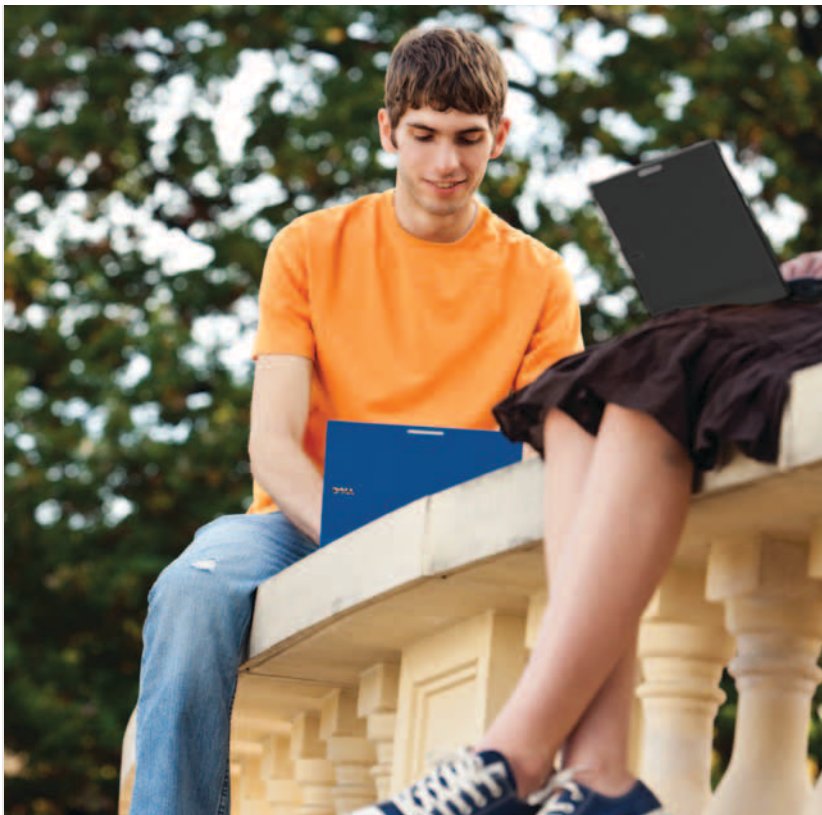
The shift from print to digital brings a choice: replicating the old system with digital textbooks or transforming the system by grouping and sharing information to create a dynamic learning experience. With unfettered access to a world of information, educators can take advantage of personalized and blended learning approaches, as well as social collaboration tools designed to remove time and distance barriers.

The question is how to bring the promise of these ideas to life. The marketplace is saturated with learning resources. How can educational institutions determine which ones are best suited to their specific requirements?

Assess key learning requirements

To address today’s educational needs, platforms for Next Generation Learning must integrate three critical aspects:

- 1. Digital content:** Print content is expensive to procure and difficult to update as information changes. Next Generation Learning relies on the effective use of in-house or published digital content across a wide array of delivery mechanisms—from desktops using Intel® processors to mobile devices—to encourage interactivity, collaboration, student engagement, and retention.
- 2. Personalized education:** A mix of formal and informal learning keeps students engaged and helps improve their ability to master the content and technology they need to succeed in the digital age. In addition, by leveraging analytics and real-time feedback delivered in a cohesive, integrated learning environment, these platforms support customization on a learner-by-learner basis. Whether personalizing the delivery of course content to individual students or expanding the level of interaction with instructors and peers, personalization enhances student outcomes and academic success. It also allows for multiple ways to assess learning.
- 3. Blended learning:** By removing the time and distance barriers of the traditional classroom



setting, educators can empower students to optimize the learning experience in ways that best suit their needs. Mixing formal, informal, online, and offline learning reinforces course content. Blended environments also use social and collaborative tools to expand how students learn and with whom they learn.

A wide range of tools and platforms addresses specific aspects of the Next Generation Learning challenge. Many schools are piecing these systems together to create an improvised learning platform. However, to truly leverage the potential of data generated by each component, educators need a simplified, integrated learning platform that provides a comprehensive view of learning outcomes and student success at individual, classroom, and cohort levels.

Deploy a comprehensive, powerful learning platform

The Dell™ Next Generation Learning Platform, powered by Intel, brings together curriculum management, digital curriculum and e-books, and lecture capture. As well, it drives increased interaction through social and collaborative tools. The platform is designed to access information from data management and student information systems to create the streamlined, robust tool set that educators and their students need.

The Dell Next Generation Learning Platform for K–12 offers an integrated, personalized experience by incorporating a breadth of functionality. It offers an Internet-based meeting place for students to discuss classroom content with teachers and peers, using whatever computing device they choose (see Figure 1). Because the platform supports synchronous and asynchronous learning, students can engage with materials on their own terms and timetable. Through interfaces tailored for their specific needs, students, educators, administrators, and parents can share and use district, teacher, and publisher content. Educators

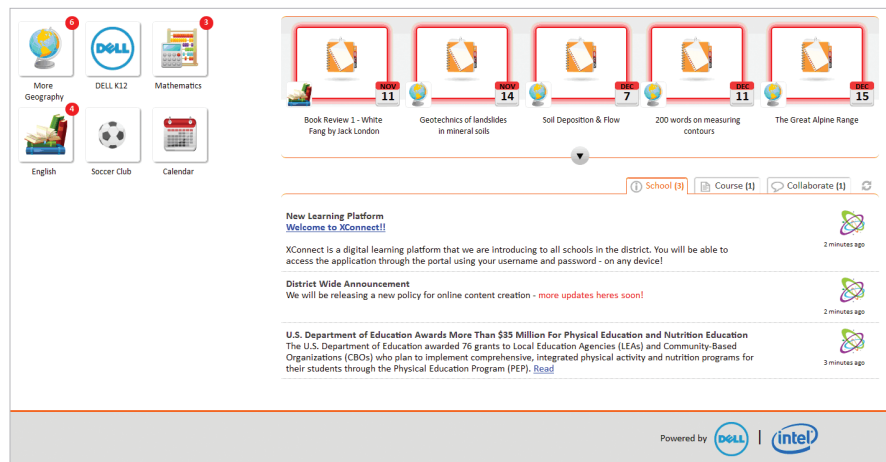


Figure 1. An intuitive, engaging interface offers a portal to online course content and collaboration

can personalize this content for individual students based on their learning styles. The platform also empowers teachers to layer customized content modules with required curriculums, as well as to share ideas and best practices across subject areas. The learning tools and digital assets are accessed through a single sign-on.

The Dell Next Generation Learning Platform for higher education is designed to integrate learning applications that an institution already has in place. It provides a strong, extensible framework for easily adding, removing, and changing these applications within a single environment. The platform focuses on three important foundational factors that drive a successful deployment:

- 1. Data management:** The platform integrates data and metadata from disparate learning applications. This allows educators to obtain a comprehensive, report-driven view of educational efforts and develop meaningful predictive analytics.
- 2. Interoperability:** Multiple learning tools and services and single sign-on methodologies are integrated to help ensure a seamless experience and ease of management. Dell Services provides application and end-user support.
- 3. Security and compliance:** Access to learning applications and data is controlled

effectively and efficiently in Intel-powered Dell data centers that support educational governance, security, and compliance requirements. Institutions also have the option of using a highly scalable, robust Dell private cloud environment.

Overall, the Dell Next Generation Learning Platform integrates core education applications and resources that address specific learning styles, collaboration, and data-driven teaching. This integration helps K–20 students, teachers, and administrators to easily get what they need for an optimal learning and teaching experience—anywhere, anytime. **PS**

Authors

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Jon Phillips is the managing director of strategy and solutions for Dell Education, State, and Local Government Services.

Learn more

Dell Next Generation Learning Platform powered by Intel for K–12:
dell.com/k12/learningplatforms

Dell Next Generation Learning Platform powered by Intel for higher education:
dell.com/hied/learningplatforms



Drawing fresh insights from a new world of learning opportunities

By Donna Boivin

Next Generation Learning strategies embracing personalized learning, collaboration, and rich digital media create vast volumes of education data. Effective analysis of this data offers valuable insights to heighten student and institutional success.



Longitudinal data in action

Laramie County Schools in Cheyenne, Wyoming, required easy access to data for tracking student progress and allocating resources to enhance the learning process. Discover how the district used Dell EDM to integrate multiple databases and run analytics for streamlined information access.

dell.com/edm/laramie

The ability to synthesize different types of education and operational data into actionable information for educators, administrators, and IT staff offers tremendous potential for enhancing Next Generation Learning experiences. Armed with comprehensive, detailed information about every aspect of the educational system, educators can use innovative tools to personalize learning while enhancing transparency and accountability.

Effective analysis of education data helps students succeed by reducing guesswork about the efficacy of a particular teaching strategy or the timing of an educational intervention—for example, giving educators the information they need to personalize the curriculum for different learning styles. Fluid information access also helps increase classroom efficiency and reduce operational expense, which in turn frees up resources to invest in fresh educational initiatives.

Strategic governance and management of the rich data sets available to educators today streamline access to relevant and timely information. By understanding how to effectively collect, store, and share many different types of data—including new data and metadata types such as social media and social collaboration activity data—educational institutions can develop predictive analytics together with traditional education intelligence. This approach helps to

develop personalized learning paths for students based on data analysis that advances student success, determines intervention strategies to improve satisfactory academic progress, and promotes best practices around college and career readiness. A well-designed and integrated data management platform opens the flow of data across systemwide resources while helping to ensure the security of privileged information. Data governance and monitoring further help to ensure data accuracy and integrity across sources.

At the same time, intensifying administrative and budget considerations need to be addressed. Reporting requirements to comply with policies and regulations for K–20 institutions have grown along with government and local accountability standards. Meanwhile, educational budgets are shrinking across the board.

The Dell™ Education Data Management (EDM) system, powered by Intel® processors,¹ is designed to address these challenges. It brings together academic, administrative, and IT teams through an integrated information management system that transforms high-quality data into actionable knowledge, which can be used to help improve educational outcomes and track student information. Collaboration among stakeholders translates the educational vision into a technology-enabled approach designed to improve the learning experience and reduce operating expenses.

¹ Intel Xeon® processors enable energy-efficient performance for power-hungry storage software, high availability and enhanced data encryption features for added security, and new usage models with scale-out architectures.

Capturing high-quality data to transform education

Dell EDM helps school districts and institutions of higher learning provide students, educators, administrators, parents, and the community with safe, secure, user-friendly access to the information they need to enhance educational outcomes. Turning education and organizational data into actionable information helps increase productivity, elevate efficiency, and improve the efficacy of program evaluation. Actionable information also helps educational institutions budget limited financial resources effectively.

Role-based dashboards and scorecards support rich collaboration and enable educators to share data and information with all stakeholders. Deploying EDM helps educational institutions determine the current state of their teaching efforts, evaluate the direction in which they are headed, and determine what measures they can take to create a positive impact in the future. Key components of EDM include the following:

- **Master data management, including data governance:** This set of processes collects, aggregates, matches, consolidates, and validates high-quality data to arrive at an authoritative “single source of truth” that is accessible to authorized stakeholders. Disciplined data governance methodologies help ensure that data is accurate and standardized across the district or institution.
- **Data warehousing:** This component is designed to provide a secure, integrated information repository that standardizes data flow, helping to increase productivity throughout K–20 organizations. Authorized stakeholders can easily and efficiently access, retrieve, and analyze longitudinal data to follow students from prekindergarten through college and into the workforce.

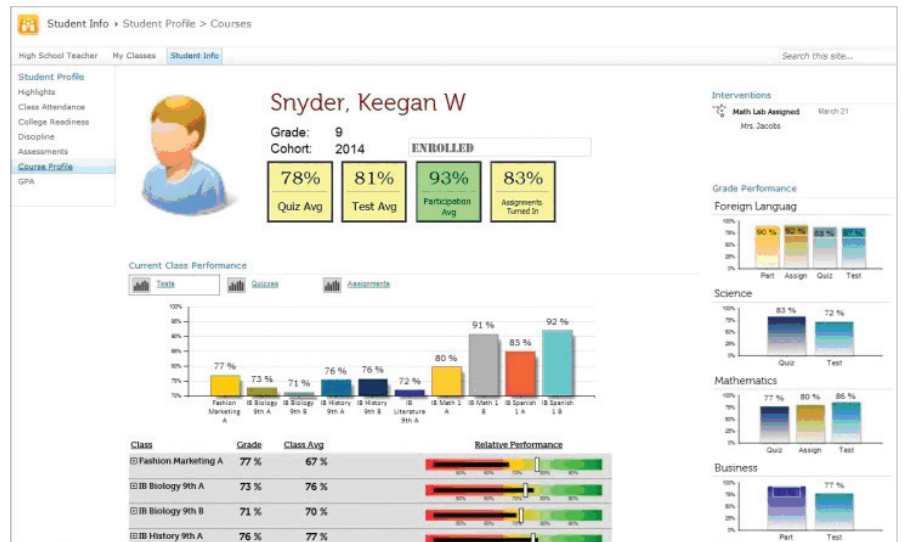


Figure 1. Easy-to-access, role-based EDM dashboards powered by Intel technologies for representing data in both spreadsheet and graphical forms

- **Education intelligence and data analytics:** These constituent elements support comprehensive, systemwide analytics to enhance information access, strengthen decision making, and help improve educational outcomes. In addition to providing background analytics for student success, budgeting, and operations management, these components help deliver information instantly to parents, students, and other departments and institutions.
- **Education data portal:** Designed to provide students, educators, and administrators secure, self-service access to the information they need at any time, this portal presents information in easy-to-interpret dashboards and scorecards that focus on key, actionable data (see Figure 1). Single sign-on can be used to enhance ease of use and offer the necessary security.

Creating actionable information to spark student success

Through education intelligence and predictive analytics, Dell EDM helps K–20 organizations personalize learning and identify opportunities for improvement.

Accurate, actionable data enables educators to identify the specific needs of individual students, helping them personalize the curriculum to suit different learning styles and proactively intervene when necessary to optimize student outcomes. EDM also can help schools and universities find the root causes of organizational successes and challenges.

By enabling school districts and institutions of higher education to identify effective and efficient instructional and operational practices, EDM helps maximize the impact of limited education budgets. EDM can also free resources to advance value-added educational initiatives and provide a platform and governance to help ensure compliance. ^{PS}

Author

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Learn more

Education Data Management:
dell.com/edm



Enriching curriculums with fluid information access

By Jeannine Cantwell and Paul Koteras



Next-generation storage pays off at American University

Learn how American University tripled its storage capacity without increasing total cost of ownership by deploying a Dell Compellent Storage Center SAN with its Intel processor-based Dell PowerEdge servers. At the same time, it improved recovery time objective by more than 48x and simplified storage management.

qrs.ly/431nmqh

Flexible, secure access to a wealth of digital content and education data is essential in Next Generation Learning environments. The Dell™ Fluid Data™ strategy helps simplify data management and scalability to optimize student outcomes—and contain costs.

Students, teachers, and administrators today are generating, storing, and consuming many different types of digital content—from classroom presentations and digitized textbooks to multimedia and blended learning materials. The rising tide of digital content enriches the curriculum and carries the educational experience far beyond the classroom. At the same time, increased requirements for storage and data access are straining the systems expected to deliver on Next Generation Learning initiatives.

While schools and universities need to provide easy, secure access to all kinds of digital

content from a broad range of computers and mobile devices, they must also safeguard privileged information. And storage challenges are intensifying as schools collect and analyze growing volumes of data in an effort to optimize curriculums, streamline operations, and personalize the learning experience.

To accommodate data growth, protect and retain data, and provide the flexibility for change, schools are looking for opportunities to cost-effectively enhance existing storage with limited resources. Small IT departments may lack the time and expertise to manage large, complex storage systems, and tight budgets often require schools to maximize

operational efficiency by using their existing infrastructure. Adopting a comprehensive approach to storage and data management helps address these challenges.

The Dell Fluid Data architecture powers a transformational portfolio of products and services that dynamically address storage challenges to help schools achieve both short- and long-term goals. By helping to consolidate storage, enhance flexibility, advance scalability, protect data, and simplify data management, Dell enables educational institutions to meet the specific and evolving needs of Next Generation Learning. (For more information, see the sidebar, "Efficient storage for agile learning environments.")

Consolidating storage for heightened efficiency

As data grows, schools need ways to control their storage footprint to help reduce expenses and minimize management complexity. Dell Fluid Data-based storage provides a comprehensive range of offerings that facilitate storage consolidation. For example, Dell EqualLogic™ PS Series Internet SCSI (iSCSI) storage area network (SAN) arrays enable IT groups to create a single, centralized, and consolidated storage environment. By using industry-standard Ethernet connectivity, EqualLogic PS Series iSCSI storage helps reduce complexity and avoid the need for specialized training and administration that Fibre Channel approaches typically require.

When used to support a virtualized server environment, EqualLogic PS Series arrays can dramatically consolidate IT infrastructure. Dell EqualLogic FS7500 scale-out network attached storage (NAS) appliances allow school IT staff to unite block-level SANs with NAS capability, which is often used to consolidate Microsoft® Windows® OS-based file shares. This scale-out NAS approach helps increase utilization of storage resources while helping to simplify management.

Thin provisioning capabilities included with Dell Compellent™ Storage Center™ SANs powered by Intel® processors help optimize storage utilization and reduce the need to add disk drives. Dell Compellent Dynamic Capacity™ thin provisioning software helps eliminate storage pre-allocation. Administrators can create virtual volumes of any size, but applications only consume capacity when writing to disk.

Dell deduplication and data compression technologies are designed to further reduce the storage footprint by helping eliminate multiple copies of redundant data. By using approaches that analyze the underlying structure of files and data types, and tailoring the deduplication algorithm to that content, deduplication and data compression help reduce the amount of disk space necessary for storage.

Enhancing storage flexibility and scalability

Dell Fluid Data-based platforms enhance flexibility by creating a virtualized pool of storage resources, enabling IT groups to accommodate changing needs while helping to maximize the utilization of existing resources. Dell EqualLogic PS Series arrays use a peer storage architecture to create a single, scalable storage pool that shares resources and scales workloads across multiple EqualLogic PS Series SANs. Automated provisioning and nondisruptive migration of data volumes among storage tiers enable IT staff to easily accommodate changing needs and varying workload requirements.

The rapid and nondisruptive scalability of this architecture is designed to handle explosive data growth. This approach enables educational institutions to expand storage easily, supporting additional digital content and other education data without the need for significant upgrades. Because each array is a self-contained unit including its own storage, processing,

Efficient storage for agile learning environments

Many schools and universities are turning to Dell Fluid Data-based storage to advance educational objectives with cost-efficient data management and storage. Here's a sampling of what they achieved.

Winton Woods City Schools

20%

After deploying a virtual desktop infrastructure consisting of Dell PowerEdge™ R610 servers with Intel Xeon® processors and a Dell Compellent Storage Center storage area network (SAN), Winton Woods City Schools in Cincinnati, Ohio, reduced new disk purchases up to 20 percent. The district used Dell Compellent Dynamic Capacity software for thin provisioning to help achieve this reduction.

dell.com/k12/wintonwoods

Roslyn Public Schools

US\$400,000

By creating a virtualized IT environment using Dell PowerEdge servers with Intel Xeon processors and Dell EqualLogic PS Series storage, Roslyn Public Schools in Long Island, New York, expanded its capacity for educational technology. And it saved approximately US\$400,000 over five years.

dell.com/k12/roslyn

Niagara College

1,200%

In Ontario, Canada, Niagara College gained the storage scalability to accommodate digital content growth and support expansion of student computer labs. Deploying Dell PowerEdge M610 blade servers with Intel Xeon processors and EqualLogic PS Series SAN arrays provided 1,200 percent additional capacity.

dell.com/hied/niagara

Indiana University Bloomington

80%

Tasked with managing a host of services cost-effectively for the eight-campus Indiana University system, the Auxiliary Information Technology department at the Bloomington, Indiana, campus deployed a Dell Compellent Storage Center SAN, powered by Intel, utilizing Dell Compellent Data Progression software. This approach allowed 80 percent of the university's data to reside on low-cost drives.

qrs.ly/721nr8u



and network connection resources, administrators can scale performance and throughput as they scale capacity.

Dell Compellent Storage Center SANs virtualize storage at the block level, creating a dynamic pool of shared storage resources designed to be available anytime to all servers. Dell Compellent Data Progression™ software provides automated tiered storage to help optimize performance and reduce costs. Data moves automatically among storage tiers, drive types, and RAID levels according to predefined rules. Using Data Progression in a virtualized environment enables IT managers to put data in the right place at the right time for the right cost.

Dell Compellent Storage Center SANs provide tremendous scalability with a persistent hardware architecture, allowing schools and universities to scale and add technology on the same platform over time without requiring a significant upgrade. They can continue to benefit from Dell Compellent capabilities, such as data progression, as they scale from small to large storage environments. These capabilities are not tied to a single system model.

Protecting data and recovering from disasters

As students, faculty, and staff increasingly rely on technology within and beyond the classroom, IT staff can implement robust yet cost-effective strategies for data protection and disaster recovery. These approaches facilitate backup of application data, digital content, student files, e-mail, and other documents, and help ensure that end users can continue to access systems and information during power outages, natural disasters, or disasters caused by human error.

Dell EqualLogic PS Series iSCSI SANs help simplify setup, configuration, and management of a disaster recovery environment while enabling schools to replicate volumes to remote sites over any distance. Built-in auto-replication capabilities provide space-efficient,

point-in-time replication to multiple remote sites. Several restore points and application-consistent copies can be restored within minutes.

Dell Compellent Data Instant Replay™ and Remote Instant Replay™ software use replication capabilities to help protect digital content, e-mail, and files by mirroring production data to an off-site environment. Data Instant Replay creates space-efficient snapshots—replays—of data on the primary SAN, which are then replicated to the secondary SAN using Remote Instant Replay. Automated failover capabilities help keep data online and enable end users to keep working in the event of a disaster.


Achieving cost-effective data backup and retention

In addition to student transcripts, schools and universities are required to keep a variety of data—such as e-mail, health records, personnel records, and other digital content—for years to comply with regulatory and legal requirements. This record retention calls for a cost-effective, highly scalable approach designed to simplify management of backup and archival data and keep information secure yet easily accessible for years to come.

Dell PowerVault™ disk and tape backup storage using Intel technology—including the Dell PowerVault DL Backup to Disk Appliance and PowerVault tape libraries—is designed to reduce the complexity of data protection and recovery for organizations of all sizes. These backup devices offer the flexibility to choose from high-performance, disk-to-disk backup and long-term, off-site, backup-to-tape storage, while streamlining implementation through integrated support for leading-edge backup applications. Additionally, the Dell DR4000 Advanced Disk Backup and Disaster Recovery Solution appliance combines an efficient backup-to-disk approach with compression and deduplication to generate an expected data reduction ratio of up to 15:1.

The Dell DX Object Storage Platform, powered by Intel, offers a disk-based platform designed to address the challenge of archiving tremendous volumes of fixed, unchanging digital content. As data volume grows, schools can easily and nondisruptively scale DX Object Storage Platform capacity to billions of files and petabytes of data. The innovative, automated object-based approach stores data objects with associated metadata to facilitate accessibility over time.

Staying focused on educational needs

As schools and universities expand digital content resources, analyze data to heighten insights, and retain data to comply with regulations, they are compelled to address a wide range of storage-related challenges. Flexible Dell Fluid Data–based storage offers scalable, secure, and robust storage environments designed to simplify management and control costs. Dell also offers a comprehensive range of storage services—from assessment and design to implementation, management, and support—enabling IT departments in educational institutions to focus on value-added contributions that advance Next Generation Learning initiatives. 

Authors

Jeannine Cantwell is a storage solution manager at Dell. She has 30 years of experience in the technology industry, with 25 years of that experience focused on IT solutions for education.

Paul Koterak is a server and storage product specialist at Dell. With 15 years of experience in the technology field, he has assisted schools with planning, implementing, and supporting their technology needs.

Learn more

Dell storage:
dell.com/storage

Dell Compellent:
compellent.com



Indiana University Bloomington

Virtualized storage makes the grade

Server and storage virtualization helps lower total cost of ownership and improve service offerings, as Indiana University Bloomington discovered when deploying a Dell Compellent™ Storage Center™ storage area network.

One of the most wired U.S. universities, Indiana University is committed to staying at the forefront of IT solutions and service delivery. In the past two years, the Auxiliary Information Technology (AIT) department of the university's Bloomington campus saw a major opportunity to improve the efficiency and productivity of the systems it manages for a wide range of nonacademic functions, including residence halls, dining services, and parking operations. "We had about 120 physical servers," says Janssen Jones, associate director of AIT Infrastructure. "Each one had direct attach storage and was usually running a single application."

The AIT team moved to a Dell Compellent Storage Center storage area network (SAN) with Dell™ Fluid Data™ architecture. The virtualized storage offered by the SAN complements the department's Microsoft® Windows Server® 2008 R2 Hyper-V™ virtual servers, helping reduce power consumption and consolidating the computing environment. The SAN aggregates physical drives into a single pool of virtual storage that is accessed by the virtual servers.

AIT was able to run 200 virtual machines on 14 Dell PowerEdge™ M610 blade servers with the Intel® Xeon® processor 5500 series and continues to consolidate older systems. The department reduced its data center footprint from five server racks to two—representing significant savings because the department rents space in the university data center. Jones says, "We were going to start




slowly with virtualization, but the benefits were too good to resist. With the SAN, our applications actually run faster when we migrate them into virtual machines, because they have access to more spindles."

Dell Compellent Dynamic Capacity™ thin provisioning allows AIT to allocate storage capacity that consumes physical resources only when data is actually written. Says Jones, "I used to try to overprovision each server. That meant paying for extra capacity before I needed it, and I'd still end up manually reconfiguring storage within a year. Now I just set up a volume and let Dell Compellent Dynamic Capacity do its thing."

Dell Compellent Data Progression™ automated tiered storage software intelligently migrates data between high-speed drives and high-capacity drives. About 80 percent of the department's data resides

on the less-costly drives, which saves money and optimizes performance—automatically.

The Storage Center Command Set for Windows PowerShell™ allows Jones to automate frequent procedures. "Scripts are easy to write and deploy. Now I can set up a highly available virtual machine in less than 10 minutes. Compare that to the weeks it takes to provision a new physical server, and you can see why we'd never do it any other way."

The time and cost savings offered by the Dell Compellent SAN are important advantages for this hardworking IT organization, and Jones sees more value ahead. "I'm guessing we won't have to buy new servers or storage capacity for at least a year, maybe two," he concludes. "Most important, we're doing a lot more than we ever could have before—and we're doing it much faster." 



Pinellas County Schools

Crossing the digital divide

A fresh approach to professional learning helped Pinellas County Schools increase student graduation rate 6.28 percent. Teachers use a Moodle course management system to share resources and engage students in Web 2.0 technologies such as wikis and blogs.

Serving 104,000 students on the western coast of Florida, Pinellas County Schools has long been recognized for its innovative use of technology. "Our students come from a wide range of socioeconomic circumstances, and many have limited access to computers outside of school. They depend on us to teach the technology skills they need to be successful after graduation," says John Just, the district's assistant superintendent for management information systems. "We want to enhance the education of all Pinellas County students by integrating technology into the curriculum throughout our 131 K-12 schools."

Change on this scale requires a comprehensive professional learning plan that includes coaching and mentoring. The district needed to reach beyond the 10 to 15 percent of teachers who had received technology training and help the rest of the instructors effectively incorporate technology into their classrooms on a daily basis.

"Our superintendent, Dr. Julie Janssen, believes that professional learning must be a process of continuous improvement that has practical applications in the classroom," says Just. One component of Janssen's vision for continuous improvement is giving teachers access to technologies they can use to collaborate and share best practices. The district selected Moodle, an open-source course management solution, to simultaneously facilitate resource sharing and provide access for teachers and students to Web 2.0 technologies such as discussion forums, wikis, and blogs. A portal powered by Focus Student Information Software (Focus/SIS) was deployed to provide access to the system.

Schools throughout Pinellas County were already using Dell™ hardware, including 7,000 Dell Latitude™ 2100 netbooks with Intel® Atom™ processors. This made Dell servers a natural choice to run the Moodle and Focus/SIS environment.

Sharing knowledge, improving curriculums

Dell Professional Learning Services worked with Pinellas County Schools to develop a multilevel approach to professional learning. "Dell has an excellent professional learning model," Just says. "It not only teaches educators how to use technology, but also gives them the experiences and resources they need to integrate technology into their instruction."



The district's Dell consultants, who are subject-matter experts in education with classroom teaching experience, helped deploy Moodle and Focus/SIS in a VMware® virtual environment that runs on clusters of Intel Xeon® processor-based Dell PowerEdge™ R610 and Dell PowerEdge R910 servers. "Dell's involvement enabled us to concentrate more on the functionality of our professional learning environment and less on the technology of making it all work," says Just.

Pinellas County Schools offers professional learning through both online and face-to-face courses. "Our Elluminate e-learning environment is completely online, and teachers love it," Just says. "We also have a lot of blended instruction, where Moodle is incorporated into a workshop. Even in a face-to-face professional learning environment, we like to incorporate Moodle as a component by posting training material, agendas, and follow-up activities." Dell provided effective schoolwide training and was instrumental in developing virtual Moodle training sites that include a variety of instructional resources for teachers to share with each other.



Now the district has more than 3,500 active courses in its Moodle system, with more than 71,000 accounts for educators and students. Teachers in nearly half of the district's schools have incorporated Moodle-based Web 2.0 technologies into their standard curriculum. "Teachers who aren't early adopters of technology take a professional learning course, and a light bulb goes off," Just says. "When they use Moodle as part of the professional learning curriculum, they see possibilities for using Web 2.0 technologies with their students, regardless of what subject or grade level they teach." For example, teachers integrate writing into their math classes by having students log into Moodle and complete their online math journals each day. Students attending the district's Journalism Magnet Program develop their own journalism portfolio in Moodle.

Dell's model for professional learning emphasizes outcomes, and Pinellas

"Teachers who aren't early adopters of technology take a professional learning course, and a light bulb goes off. They see possibilities for using Web 2.0 technologies with their students, regardless of what subject or grade level they teach."

—John Just

Assistant superintendent for management information systems
at Pinellas County Schools
July 2011

County Schools has taken this message to heart. "We're trying to embed an 'inquiry' component into all of our professional learning opportunities," Just explains. "We want to be sure teachers are thinking about their professional practice and are motivated to continue improving. Rather than giving a test at the end of a course, we ask them to go back to their school and analyze the implications of what they've learned."

The change in the professional learning environment has had real results for Pinellas County students. "The graduation rate for Pinellas County Schools has jumped by 6.28 percent in the two years since we revamped our professional learning environment," Just says. "We've also seen incremental increases in our students' scores on the Florida Comprehensive Assessment Test (FCAT). Those improvements are all about paying attention to the details and focusing on outcomes."

Strengthening disaster recovery

As a separate services initiative, the district engaged Dell IT Consulting Services to develop a disaster recovery plan to complement its crisis management plan. The disaster recovery plan meets the district's goals to protect and preserve electronic data, including student, teacher, staff, and administrative records.

The plan documents field-tested processes for the management information systems team to expedite the recovery

of hardware, software applications, data, and infrastructure. Included step-by-step procedures are designed to restore business-critical systems and networks in the event of a long-term interruption of normal operations. The plan's scope includes installation of additional backup systems and a simulation exercise to test the plan's efficiency.

Achieving a standard of excellence

The professional learning program has been so successful that Pinellas County Schools has standardized on Dell Professional Learning Services. "Our teachers are very receptive to the hands-on and practical approach of Dell Professional Learning Services," Just says. "When teachers are highly engaged and excited about using the technology themselves, they can easily see how students would benefit from it. Dell has been a strategic partner in our success." **PS**



Enhancing education through technology

Watch how one-to-one computing opens new opportunities for students in the Pinellas County Schools district.

qrs.ly/id1nrai



Transitioning IT to meet the demands of a digital learning environment

School districts and institutions of higher learning can cost-effectively identify and prioritize needed changes in existing infrastructure to support rigorous digital learning environments through a comprehensive Dell™ IT simplification assessment.

Dive deeper: IT simplification assessment

The technology framework to support a digital learning environment helps reduce operational costs and increase IT efficiency while enhancing student outcomes. Download these white papers to learn more about how the Dell IT simplification assessment helps schools and universities transform existing IT infrastructure for the digital age.

dell.com/k12/itsaoverview
dell.com/hied/itsaoverview

Education leaders today have an unparalleled opportunity to increase the relevance and the reach of the learning environment. Rising use of wireless networks and mobile computing devices is enabling a new paradigm in education that offers students, teachers, and administrators anywhere, anytime access to educational resources. As a result, school districts and institutions of higher education are accelerating the transition to digital learning approaches, which is increasing demands on the underlying IT infrastructure.

Accompanying these opportunities, however, are budget pressures and escalating enrollment rates. Many public school districts have cut spending during these difficult economic times, and traditional funding sources for higher education, such as grants and donations, are under tremendous strain.

To help tackle these challenges, K–20 education communities can utilize the Dell IT simplification assessment. This service is

designed to optimize the efficiency of existing IT infrastructure and cost-effectively apply the right touch of technology to support a comprehensive digital learning environment.

IT simplification assessment: Identifying infrastructure needs

The Dell IT simplification assessment enables K–20 education institutions to discover opportunities to shore up IT infrastructure to meet the demands of digital learning environments. This comprehensive, end-to-end evaluation helps identify unnecessary costs and complexities and reveal obstacles that may otherwise prevent successful implementation of digital learning and technology initiatives (see Figure 1).

To conduct the assessment, Dell education technology consultants—veteran educators and professionals well seasoned in educational IT—visit a district or college campus and perform an extensive analysis of its entire IT infrastructure. The assessment reviews the

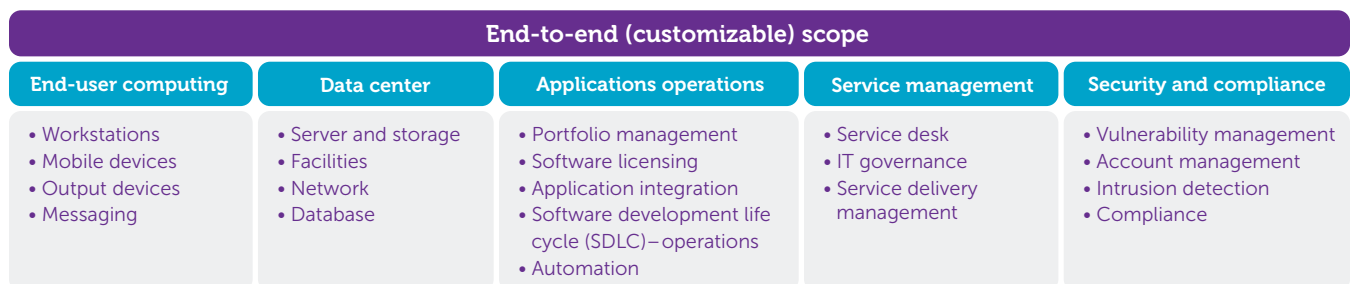


Figure 1. Performing a technology readiness assessment to meet the demands of a digital learning environment

architectural, financial, and operational components of the current infrastructure, rates the system's capacity to support a next-generation digital curriculum, and recommends how to improve the system through IT simplification. Specifically, Dell consultants provide the following services as part of the assessment:

- Evaluate current IT operations—including end-user computing, the data center, applications, IT service management, and security and compliance—and collect systemic, financial, and qualitative data
- Identify cost-reduction opportunities and operational effectiveness
- Develop a road map for helping reduce complexity and maintenance costs
- Offer specific recommendations and identify potential for improvement based on best-in-class approaches to educational infrastructure

A Dell IT simplification assessment can help educational institutions realize specific goals based on their Next Generation Learning initiatives. For example, the Dubuque Community School District in Iowa utilized this assessment to address key technology disparities across its infrastructure. (See the sidebar, "Following a technology road map.")

Efficient IT: Transforming digital learning environments

As K–20 communities move toward digital learning environments, having in place an Efficient IT infrastructure that aligns with educational goals is critical. Optimizing systems and infrastructure to meet the heightened technology demands of a digital-centric curriculum helps educational institutions ensure the success of digital learning initiatives.

In addition, avoiding unnecessary complexity helps increase efficiency and reduce costs. Moreover, identifying

and prioritizing needs and implementing recommended improvements can enhance the continuity of learning. A Dell IT simplification assessment empowers K–20 institutions to reallocate budget and resources toward innovation to meet the challenges of dynamic education requirements—and, most importantly of all, to inspire students to achieve their full potential. **PS**

Dubuque Community School District:

Following a technology road map

When Larie Godinez became superintendent of the Dubuque Community School District, she was dismayed by the findings in an IT survey of the district's 18 schools, which served approximately 10,400 students in 2009. Godinez discovered big disparities in the technology installed at each site, and the level of computers and Wi-Fi varied widely—with spotty wireless service for those buildings having wireless capability.

Faculty, staff, and district board members told their new superintendent that technology was sorely lacking for both students and teachers. Godinez knew something needed to be done and looked for someone who could come in and "do a top-to-bottom audit of where we were and could tell me where we needed to go."

After discovering the Dell IT simplification assessment, Godinez was surprised by the K–12 education and technology experience that the Dell consultant possessed. "I didn't expect an educator to walk through my door; I expected just an IT person," she says. The educational consultant's experience helped bring a level of understanding not usually available from someone with strictly an IT background.

The district's assessment focused on three areas: the data center, the full network, and the wireless network. Once it was finished, Dell consultants worked on a design report that served as a road map for implementing needed changes through recommendations and proposed projects to occur over an 18- to 24-month time frame. Improvements included purchasing 950 laptops using Intel® Core™ processors; comprehensively upgrading the wireless and wired networks; enhancing server and storage capabilities; moving the antiquated e-mail system to a hosted, enterprise-class environment; and implementing a new learning management system.

The improvements put in place by Dell have all been tied to the type of Next Generation Learning initiatives that Godinez had in mind. "If we're going to prepare kids for the real world of technology, these projects are going to get us there," says Godinez.

Learn more

Dell IT simplification practice:
dell.com/itsimplification

Efficient IT planning:
dell.com/k12/itplanning
dell.com/hied/itplanning

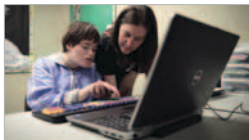
Intel server refresh savings estimator:
bit.ly/intelxeonestimator



Unlocking the potential of all learners

By Kelli Hodges

Assistive technology can revolutionize the lives of students with special needs. By providing a single source for acquiring, managing, and servicing assistive technology, Dell, working with Intel, empowers students to meet their goals.



A model for lifelong learning

Technology is at the heart of the programs offered by the Training, Education, and Research Institute (TERI). Discover how the Dell Assistive Technology Service helps TERI carry out its mission of improving the quality of life for individuals with developmental disabilities.

dell.com/teri

For students with special needs, assistive technology promotes independence and helps provide a voice. Technologies such as text-to-speech software, magnifying screens, and touch-screen monitors help students engage in classroom and everyday-life activities by facilitating communication and enabling access to the world around them (see the sidebar, “Opening the door through video modeling”).

However, obtaining the best assistive technology for individual students in a timely manner can be a complex process. Because every individual requires a customized solution, acquiring and implementing assistive technology may strain a school’s infrastructure—not to mention its overall funding and resource allocation.

In K–12, students with special needs go through a series of assessments to identify assistive technology that is suited to their overall educational needs and quality of life. In higher education, the disabled student services office helps self-identified students with special needs acquire assistive technology to meet their educational requirements.

To obtain the right mix of special hardware and software, educators must manage a procurement process that involves multiple purchase orders to different vendors. After tracking the orders to verify that the equipment has arrived on-site, they must then figure out how to install and configure the various components. In the meantime, students need to receive their assistive technology devices rapidly to help them learn at the same pace as their

Expediting the acquisition of assistive technology

To help students quickly obtain the proper assistive technology devices, Dell has teamed up with assistive technology integrator Electronic Vision Access Solutions (EVAS) to develop the eCONSULT tool. Using eCONSULT, educators can obtain recommendations on best-of-breed software and hardware that meet the needs of a student’s particular disability.

Since 1979, EVAS has offered a wide range of access devices for people who are visually, physically, hearing, or learning disabled. EVAS provides powerful assistive technologies that are pretested, installed, and configured on Dell desktop and laptop computers powered by Intel processors.

classmates. Students, educators, and parents all need training on both hardware and software. In addition, schools must support and service the devices throughout the student's time at the institution.

Streamlined adoption

Proper planning and management helps streamline the process of acquiring and adopting assistive technology for students, parents, IT administrators, and disabled student services offices. The Dell™ Assistive Technology Service provides access to best-of-breed technology and acts as a single source for procuring, implementing, and supporting assistive hardware and software.

Dell and Intel have worked together to enable schools and universities to easily integrate assistive technology into their IT infrastructures. Dell platforms powered by Intel® Core™ i5 and i7 vPro™ processors are well suited for compute-intensive assistive technology systems. The Intel technology helps simplify the deployment, implementation, and remote management of the assistive technology systems.

Dell has also teamed with Electronic Vision Access Solutions (EVAS), an assistive technology provider, to deliver integrated high-quality hardware, software, and peripherals developed specifically to meet the requirements of students with special needs. (For more information, see the sidebar, "Expediting the acquisition of assistive technology.")

The Dell Assistive Technology Service facilitates the implementation of assistive technologies. For example, a single consolidated delivery avoids the need to manage and track shipments from multiple vendors. Dell handles pre-staging of hardware to help ensure functionality where appropriate, as well as custom factory-integration services such as imaging, asset reporting, and asset tagging relating to special-needs claim IDs. In addition, Dell provides scheduled installation services with advance notice of deliveries.

Training and support are critical for helping a student succeed with assistive devices, which are often used at home as well as at school. A dedicated team trains students, parents, educators, and specialists on the devices. Direct access to both instructional and technical support is also available to enhance the overall learning experience for each student.

Focus on learning

By providing a single point of contact through which educational institutions can acquire, integrate, and support assistive technologies, Dell enables educators to reduce the amount of time spent on administrative tasks related to deploying technology that empowers students with special needs. As a result, schools can stay focused on their most important goal: delivering an outstanding education for every student. **PS**



Opening the door through video modeling

Meet Chris, a 24-year-old in the autism spectrum. Chris was silent until he was introduced to music on his 23rd birthday. He began interacting with musical instruments and could model his teacher playing the piano. Through video modeling, the teacher started taping the playing sessions so Chris could mirror the teacher's hands. Chris would then sit at the piano and play while watching the video on his Dell Latitude™ ST tablet powered by the Intel Atom™ processor. Six months later, Chris began to sing. Chris now knows how to read music and is communicating—all thanks to assistive technology.

Author

Kelli Hodges is the strategic alliance manager for the Dell Global Education team. She has more than 21 years of experience in special education, digital content, and implementation.

Learn more

Dell assistive technology for K–12:
dell.com/k12/ats

Dell assistive technology for higher education:
dell.com/hied/ats



Desktop virtualization: Flexible access to campus learning resources

By Patrick May and Erica Hilgeman

Simplified IT management is critical to efficiently support students who expect anywhere, anytime access to school computing resources. Dell™ Virtual Labs enables students to use learning resources from their own devices—while easing administration.

Today's students, educators, and administrators require constant, reliable access to a school's computing resources using their own devices, which include laptops, tablets, and smartphones. Desktop virtualization is designed to provide a cost-efficient, secure means of delivering these computing resources. In a virtualized desktop environment, a physical desktop system is converted into a virtual one, allowing application processing to take place in the data center.

This technology helps simplify the process of delivering applications to many different types of devices and empowers distance learning. At the same time, it frees IT administrators from basic support tasks, allowing them to focus instead on strategic opportunities. Desktop virtualization also gives IT staff tight control over access, security, and storage of campus data. And it allows campus leaders to provision services in an increasingly complex and dynamic environment.

While they promise to yield huge benefits, desktop virtualization deployments must be managed effectively to avoid incurring unnecessary complications. And components of the IT infrastructure must be sized properly to support the needs of a virtual desktop infrastructure (VDI), for example. (For more information, see the sidebar, "Understanding storage and networking requirements.") To help educational institutions bring the various pieces together, Dell Virtual Labs combines tested reference architectures with

Dell service and expertise to provide an end-to-end desktop virtualization solution.

Dell Virtual Labs enables anywhere, any-device computing, ranging from low-power, low-footprint thin clients to full-featured, intelligent clients with Intel® Core™ I processors for demanding tasks. This desktop virtualization solution is designed to work equally well for school-owned clients and the multitude of devices students bring to campus every day.

Building on reliable, validated architectures

Dell Virtual Labs expands on Dell Desktop Virtualization Solutions (DDVS), leveraging prepackaged and configured hardware, software, and services to enable fast, simplified implementations. Dell Virtual Labs is available in three tested and validated reference architectures that are based on established industry virtualization platforms:

- **Dell DVS Simplified Appliance VDI** provides a simple, all-in-one package that is well suited for small institutions with limited budgets. A Dell PowerEdge™ server powered by Intel Xeon® processors comes pre-installed with Citrix® VDI-in-a-Box software. The appliance integrates the necessary capabilities—connection brokering, load balancing, desktop provisioning, high availability, and management functions—into a single package that runs on the server with local storage. This integration



“Desktop virtualization offers flexible access to an increasingly mobile student population, while allowing IT departments to deploy and upgrade software quickly and efficiently.”



University of Maryland pilots virtual desktops

Students live in a wireless world and expect online access to campus resources from their own devices. Find out how Dell Virtual Labs helps the University of Maryland embrace IT consumerization, enabling members of this academic community to access campus resources from anywhere, at any time.

dell.com/hied/maryland



enables IT staff to get a virtual lab up and running in as little as an afternoon. This solution supports end-user devices ranging from low-power, low-footprint thin clients to full-featured, intelligent clients with Intel Core I processors for demanding tasks.

- **Citrix XenDesktop® VDI** delivers virtual desktops for Microsoft® Windows® XP, Windows Vista®, or Windows 7 operating systems to end users on a variety of endpoint devices. Virtual desktops are dynamically assembled on demand, providing students, educators, and administrators with pristine yet personalized desktops each time they log on.
- **VMware View™ VDI** centrally delivers desktop services from the cloud to help simplify IT management and increase security and control of end users while decreasing costs. Dell Virtual Labs with VMware View has received the VMware® Ready designation—the first educational solution to do so.

The Dell Solutions Laboratory, along with Citrix and VMware, has spent over 50,000 staff-hours testing configurations to identify the right scenarios and develop stable and scalable solutions that address

specific educational needs. Six frequently used applications have undergone extensive testing and have been validated on all three platforms:¹

- Adobe® Creative Suite® software, which includes Adobe Photoshop®, Adobe Illustrator®, and Adobe Premiere® Pro CS5 software
- Autodesk AutoCAD LT drafting software
- Wolfram Mathematica 7 technical computing software
- MathWorks MATLAB technical computing software
- SAS analytics software
- IBM® SPSS® analytics software

Achieving cost-effective, secure lab access

Desktop virtualization helps education leaders and IT staff address the complex challenges of academic computing. It offers flexible access to an increasingly mobile student population, while allowing IT departments to deploy and upgrade software quickly and efficiently—freeing IT to develop strategic goals. And because data and applications are centralized, desktop virtualization helps control costs

¹For more information on the architectures and testing results, see “Dell Virtual Labs with Citrix XenDesktop,” content.dell.com/us/en/corp/d/public-solutions-hied-en/Documents-virtual-labs-with-citrix-xendesktop.pdf.aspx; “Dell Virtual Labs with Citrix VDI-in-a-Box,” content.dell.com/us/en/corp/d/public-solutions-hied-en/Documents-virtual-labs-with-citrix-vdi-in-a-box.pdf.aspx; and “Dell Virtual Labs with VMware View,” content.dell.com/us/en/corp/d/public-solutions-hied-en/Documents-virtual-labs-with-vmware-view.pdf.aspx.



Understanding storage and networking requirements

To successfully deploy a desktop virtualization implementation such as Dell Virtual Labs, educational institutions must first understand the requirements of the supporting IT infrastructure. Desktop virtualization strongly affects two key infrastructure components: storage and networking.

Storage plays a critical role in the overall performance of a virtual desktop infrastructure (VDI). In VDI, each instance of a virtual desktop and related user data is connected to back-end storage. A large number of virtual desktops requires a robust infrastructure to support the corresponding amount of network traffic. For example, at the beginning of a class, hundreds of students might log in at the same time, causing a boot storm—a scenario that must be anticipated in the virtualization architecture. Also, storage for VDI must support different types of users running different types of workloads, which access the same shared disks but have different I/Os per second (IOPS) and read/write ratio requirements based on their respective applications.

Dell Fluid Data™-based storage, including Dell EqualLogic™ PS Series storage area networks (SANs) and the Dell Compellent™ Storage Center™ SAN, is well suited to VDI environments. These Dell storage offerings are built on Fluid Data architecture, which is designed to manage and protect growing data volumes by intelligently and automatically storing data in the right place, at the right time, for the right cost.

Dell Fluid Data-based storage can be virtualized to create one centralized storage resource pool for running virtual desktops. It provides on-demand balancing of capacity, allowing data to span multiple drives and using additional spindles on the fly to help ensure high performance during events such as boot storms. To support fast-growing virtual workloads, Dell storage is easily scalable; added arrays or disks automatically join the storage pool. Dell storage is also integrated with virtualization platforms from VMware and Citrix that enable built-in disaster recovery capabilities and simplified storage

management through a single console. Moreover, Intel Xeon processors, which power the Dell Compellent Storage Center SAN, enable energy-efficient performance for power-hungry storage software, high availability and enhanced data encryption features for added security, and new usage models with scale-out architectures.

Because VDI taps into the full performance and software capabilities of the IT infrastructure, the required number of physical servers and storage arrays can be decreased—which in turn causes a reduction in the physical connections that the applications use to access stored information. This decrease in the number of physical connections may lead to an increase in bandwidth requirements.

As a result, high-speed interconnects are required to help ensure the performance and flexibility necessary to support a successful VDI deployment. A growing number of educational institutions are migrating from Gigabit Ethernet (GbE) to 10 Gigabit Ethernet (10GbE) and 40 Gigabit Ethernet (40GbE) networking, which helps lower port density, reduce the number of switches and cables required, and simplify network management.


The Dell Force10 data center networking portfolio offers open, standards-based networking resources for virtualized environments. By standardizing the network framework, IT organizations can deploy open configurations for optimal scalability and performance—without locking themselves into proprietary architectures. Dell Force10 networking includes high-density, line-rate GbE, 10GbE, and 40GbE connectivity and open, standards-based Layer 2 and Layer 3 feature sets.

For institutions considering a desktop virtualization deployment, Dell Services helps assess the current IT framework, determine an appropriate implementation, and transition the existing environment into a robust, scalable infrastructure designed to accommodate growth quickly and flexibly.

related to IT security and management while helping to reduce overall security risks for students and the institution.

Dell Virtual Labs helps simplify the desktop virtualization adoption process from discovery to deployment to support, enabling an institution to make the most suitable choices for its specific infrastructure, challenges, and opportunities. As part of the discovery phase, a virtual appliance and agent software is deployed on the network to gather detailed data from each desktop

targeted for virtualization. The outcome is an expansive and detailed report of the desktop environment and user profiles. This data-driven feedback is used as the basis for creating a productive virtual desktop environment.

Dell Virtual Labs incorporates open, industry-standard components so that educational institutions have a clear path to expedient upgrades and comprehensive support throughout the life cycle of the deployment, while advancing flexibility and agility. 

Authors

Patrick May is a solutions architect for industry solutions within the Dell Solutions Center. He has a background in enterprise architecture and virtualization and has been working on Dell Virtual Labs for the past year.

Erica Hilgeman serves as the marketing manager for all things related to desktop virtualization in the Dell Public Business Group and specializes in solutions for education.

Learn more

Dell Virtual Labs:
dell.com/virtuallabs



Securing wireless access through device fingerprinting

By Robbie Burton

For educational institutions inundated with personal wireless devices, network security is a paramount concern. The device fingerprinting capability of Dell™ PowerConnect™ W-Series platforms enables secure, role-based access to campus resources.

Following the rules

A variety of regulations that apply to educational institutions must be considered when providing security for wireless networks, including the following:

- Family Educational Rights and Privacy Act (FERPA) regulations designed to protect the privacy of students' education records, including health information
- Privacy and security rules of the Health Insurance Portability and Accountability Act (HIPAA) in cases that are not covered by FERPA
- Children's Internet Protection Act (CIPA) regulations for K–12 to help ensure that children do not access inappropriate Internet content while they are in school

Device fingerprinting helps educational institutions address many of the FERPA and HIPAA requirements. Dell also provides several options to help schools address CIPA regulations through partners such as SonicWall, Blue Coat, and Impulse Point.

A look at today's campuses shows the effect of an increasingly mobile population: students, faculty, and staff are bringing their personal laptops, smartphones, tablets, and other wireless devices with the expectation that they can use these devices to access online learning resources. As a result, many educational institutions are adopting personal device policies. These policies often permit the campus population to use personal wireless devices to access educational services and content in order to help improve productivity and engagement.

However, the influx of wireless devices introduces security and configuration challenges and places additional demands on campus networking resources. Device fingerprinting capabilities such as the technology built into Dell PowerConnect W-Series wireless network platforms facilitate personal device policies by enabling the necessary security and network access.

Meeting security requirements in educational settings

When it comes to safeguarding campus resources, educational institutions need strong access control to help ensure that only authorized end users are permitted on the network and have access to the appropriate Web sites, applications, and information. Institutions must provide security for content ranging from test materials to grade records and other sensitive student information. In addition to their own policies, institutions must also abide by formal regulations established by government and education agencies. (See the sidebar, "Following the rules.")

Managing network access with device fingerprinting

Typically, a network will allow access to any device if the end user logs in with a valid username and password. This user authentication approach assumes that the device is trusted. But because the personal wireless devices used to access a campus network may potentially be insecure, it is critical to authenticate the device as well as the user.

The device fingerprinting capability built into Dell PowerConnect W-Series mobility controllers is designed to provide the combination of easy

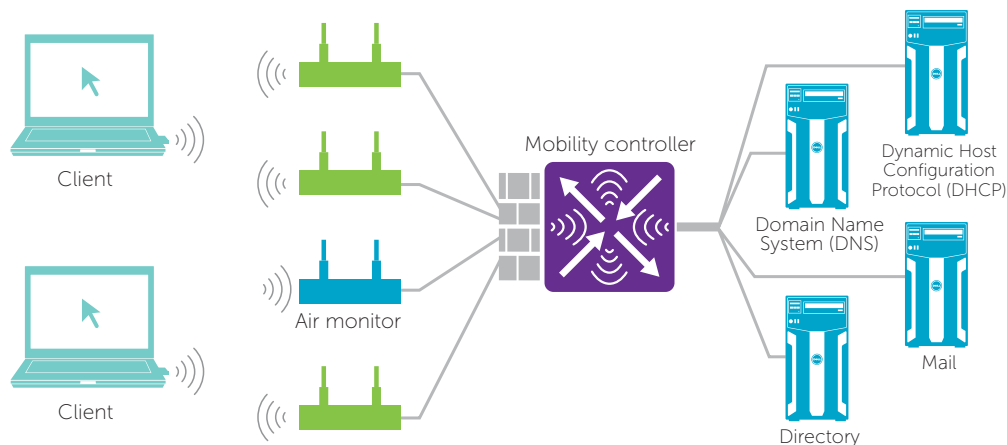


Figure 1. For device fingerprinting, the Dell PowerConnect W-Series mobility controller must be in the DHCP data path

access and security needed to make the on-campus use of personal wireless devices practical. This feature enables the mobility controllers to automatically identify and classify a variety of wireless, as well as wired, devices. The device fingerprinting relies on stateful inspection of Dynamic Host Configuration Protocol (DHCP) packet exchanges, so the PowerConnect W-Series mobility controller must be in the data path of the DHCP exchange (see Figure 1).

When an end user logs on and authenticates, the device type is taken into account. Network administrators can assign role-based policies for specific devices—policies such as restricting access to certain protocols, completely blocking access, or limiting bandwidth. Assigned roles invoke access control lists (ACLs) and other mechanisms for enforcing these policies. The same end user can be granted different levels of access depending on device type. For example, a policy may allow a student to access three applications from a personal tablet and five or six from a school-issued laptop.

Because this approach relies on roles defined by the organization, each educational institution can develop policies to meet specific management and compliance requirements. As a

result, institutions can set different rules for school computers and the personal devices of administrators, students, teachers, and visitors.

PowerConnect W-Series wireless network platforms also enable IT organizations to apply centralized quality of service (QoS) policies to help provide acceptable wireless speed and access. For example, if a group of students needs to take a standardized test using a particular application and classroom, device fingerprinting capabilities of the PowerConnect W-Series can help ensure that ample network bandwidth is allocated to the application and access points at the test location.

Device fingerprinting can also be used to limit access to school materials and information that is available through the Web. For example, a higher-education student accessing course materials for distance learning might be granted access through only one approved Web portal.

Empowering schools for mobile device networking

As students, faculty, and staff bring their own mobile devices into the educational environment, IT organizations must cope with rapidly growing demand for access and security. Dell PowerConnect

W-Series wireless network platforms provide educational institutions with powerful capabilities such as device fingerprinting. These capabilities allow network administrators to assign network policies based on device and OS types, enhancing control of which devices can access the network and how the devices are used.

By including the requirements of personal wireless devices in their IT strategies, educational institutions can greatly facilitate anytime, anywhere access to support the educational needs of a mobile campus community. **PS**

Author

Robbie Burton is a senior network solution analyst/strategist at Dell. He owns the network solution strategy for the Dell Public Business Unit.

Learn more

Dell wireless networking for K–12:
qrs.ly/bm1nmq2

Dell higher education:
dell.com/hied



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