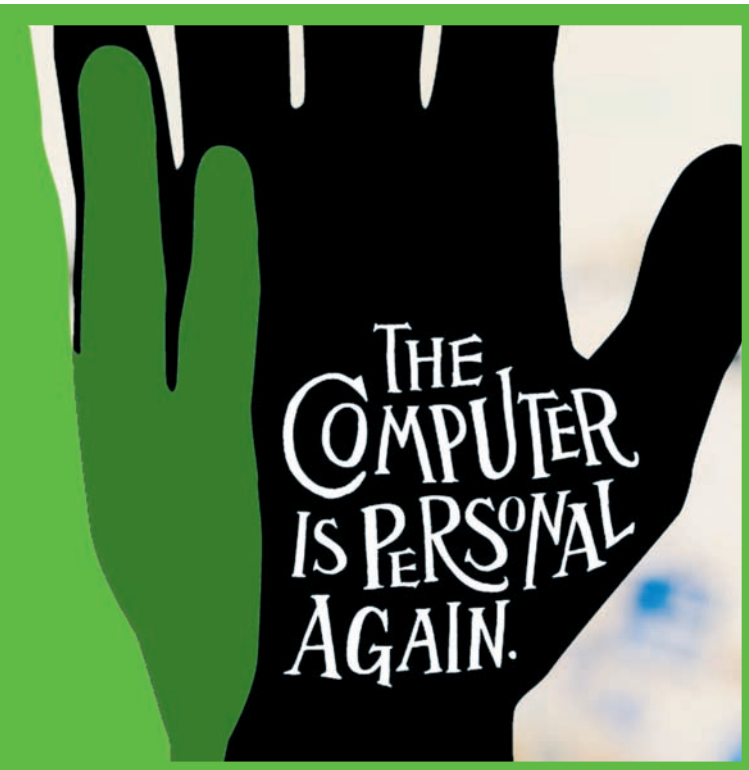
New students, new tools, new possibilities

Creating digital learning environments



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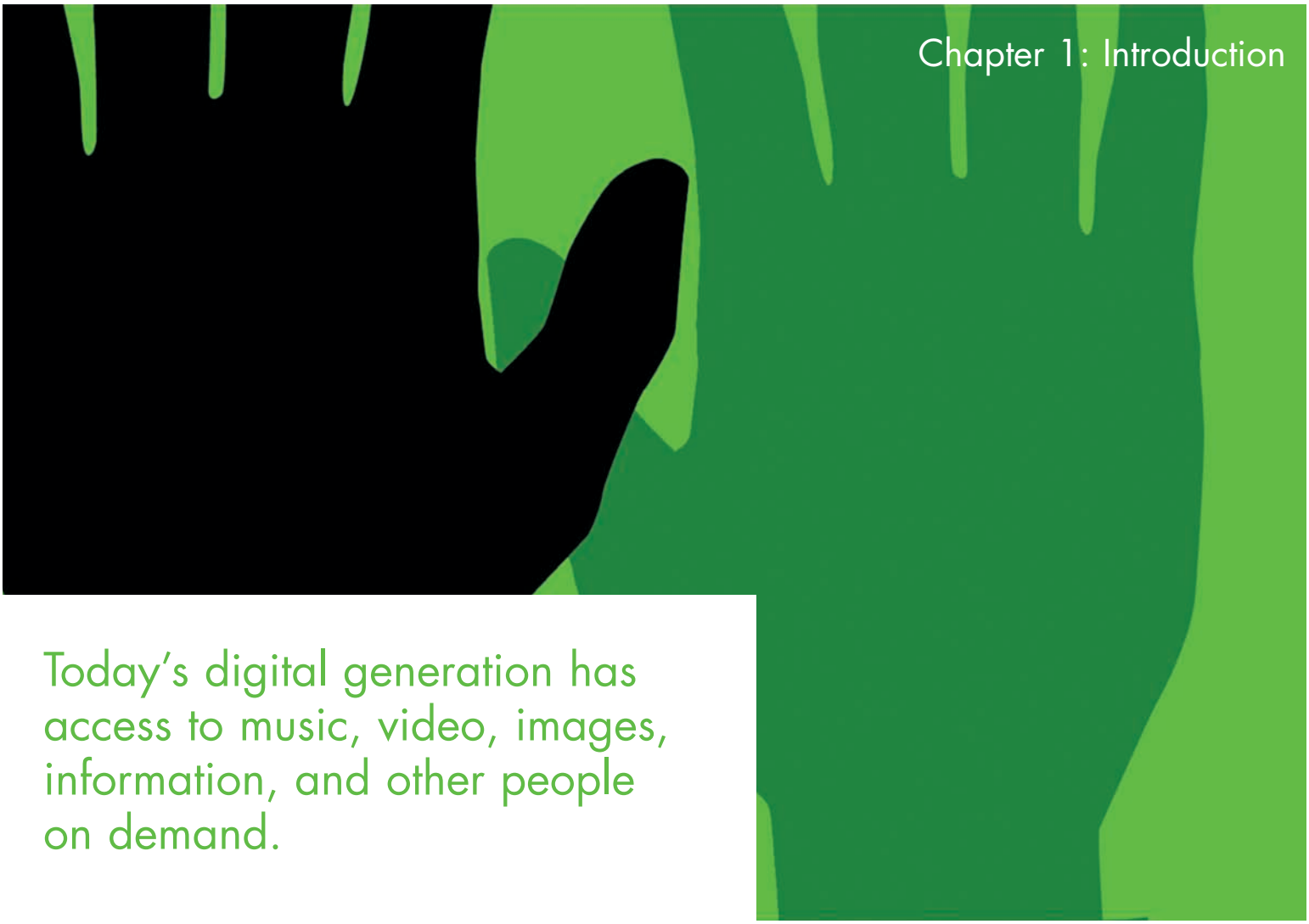


Chapter 1: Introduction

Today's digital generation has access to music, video, images, information, and other people on demand.

They create MySpace personas, YouTube videoclips, personal blogs, and podcasts.

They communicate with cell phones and Instant Messaging. They hang out online – often on social networking Websites. It is no wonder that this generation expects personalization from education too.

Who are these students and why are they different? Some say that this is the first time (with rock and roll a distant second) that a generation is so different from its parents. Generation Next, as they are sometimes called, grew up using devices that adults often struggle to understand and use.

The Pew Research Center released "A Portrait of Generation Next." In it, they conclude, "A new generation has come of age, shaped by an unprecedented revolution in technology and dramatic events both at home and abroad. They are more comfortable with globalization and new ways of doing work. They are the most likely of any age group to say that automation, the outsourcing of jobs, and the growing number of immigrants have helped and not hurt American workers. Asked about the life goals of those in their age group, most Gen Nexters say their generation's top goals are 'fortune and fame.'"

In their report "Teens and Technology: Youth are Leading the Transition to a Fully Wired and Mobile Nation," Pew researchers state, "The number of teenagers using the Internet has grown 24% in the past four years and 87% of those between the ages of 12 and 17 are online, and more than half (55%) of all online American youths ages 12-17 use online social networking." See more data in the sidebar "Close to nine in ten teens are Internet users." on the following page. However, keep in mind that there is still a digital divide, and a large group of students do not have Internet access.

Close to nine in ten teens are Internet users

The vast majority of teens in the United States, 87% of those aged 12 to 17, now use the Internet. That amounts to about 21 million youth who use the Internet, up from roughly 17 million when we surveyed this age cohort in late 2000. Not only has the wired share of the teenage population grown, but teens' use of the Internet has intensified. Teenagers now use the Internet more often and in a greater variety of ways than they did in 2000. There are now approximately 11 million teens who go online daily, compared to about 7 million in 2000.

- 87% of U.S. teens aged 12-17 use the Internet, up from 73% in 2000. By contrast,
- 66% of adults use the Internet, up from 56% in 2000.
- 51% of teenage Internet users say they go online on a daily basis, up from 42% in 2000.

At the same time, the scope of teens' online lives has also broadened. One out of every two teens who use the Internet lives in a home with a broadband connection. Wired teens are more frequent users of instant messaging. And they are now more likely to play games online, make purchases, get news, and seek health information.

- 81% of teen Internet users play games online. That represents about 17 million people and signifies growth of 52% in the number of online gamers since 2000.
- 76% get news online. That represents about 16 million people and signifies growth of 38% in the number of teens getting news online since 2000.
- 43% have made purchases online. That represents about 9 million people and signifies growth of 71% in teen online shoppers since 2000.
- 31% use the Internet to get health information. That represents about 6 million people and signifies growth of 47% in the number of teens using the Internet this way since 2000.

From Teens and Technology: Youth are Leading the Transition to a Fully Wired and Mobile Nation

The world comes to today's students online. And the world is very different from the one most of us grew up in.

Technology has made all the difference and the results are dramatic. New York Times writer Thomas Friedman says, "The World is Flat."

He says that the convergence of a digital world with rapidly shifting global economic power has transformed what we need from our schools. It's not a matter of more education, certainly not more of the same, but of providing different education, using strategies and tools that address new realities.

Friedman believes that schools must be able to horizontalize: "Move from 'command and control' to 'connect and collaborate.'" Students will need to be:

- Collaborators
- Leveragers
- Synthesizers
- Explainers
- Eco-friendly
- Personalizers

He says that schools should teach greater collaboration and synthesizing skills, create a community of learning, cultivate the entrepreneurial spirit, and help everyone learn how to learn.

A coalition of business leaders agree that technology-empowered learning is a requirement for any education institution to be an effective school. Learning for the 21st Century, a report from the Partnership for 21st Century Skills, explains how schools can best prepare students to succeed; it focuses on the key elements of 21st Century learning that rely on technology as tools.

The report challenges schools and policymakers to expand their focus beyond students having basic competency of core subjects to their understanding the content at much higher levels. It proposes that students need to know how to think critically, apply knowledge to new situations, analyze information, comprehend new ideas, communicate, collaborate, solve problems, and make decisions. It stresses the need to incorporate information and communication technologies into education from the elementary grades up and use experiences that are relevant to students' lives, connected with the world beyond the classroom, and based on authentic projects. The report recommends moving beyond standardized testing as the sole measure of student learning; balancing traditional tests with classroom assessments to measure the full range of students' skills; and using technology-based assessments to deliver immediate feedback.
Such change is exciting… and challenging… and sometimes threatening.

What's driving change?

Some big shifts are changing the way people and organizations work.

Three major global shifts:

1) The world is flat: It's becoming a horizontal, heterogeneous, networked world.
2) Work is no longer what it was for previous generations who stayed in the same kind of job for the same company for their entire working lives.
3) Required skills include critical thinking and reasoning skills as well as the three r's.

Three major technology shifts:

1) Processes and all content are being transformed from physical and static to digital, mobile, and virtual.
2) There is new demand for simplicity, manageability, and adaptability in technology.
3) Systems, applications, divisions, and supply chains that were previously vertical and disconnected have to connect and interoperate horizontally in order to optimize resources and unlock new value.

Students want their learning to be personalized. Technology has to be wireless so it travels with them and provides what they want when they want it. What they want is engaging: music, videos, social networking, and collaboration, not to mention "cool" hardware.

Three major human shifts:

1) Young people are ahead of adults (teachers and parents) in technology use.
2) Administrators must harness technology to manage schools, both for administrative and learning systems.
3) Adapting and transforming systems is expensive, difficult, and necessary for everyone.

Rethinking the organization

Organizations (yes, that means schools too) have to re-think what an organization is—top to bottom.

- Organizations and technologies are no longer about vertical chains of command and stand-alone islands of automation.
- Organizations are becoming horizontal collections of processes, supported by applications and technology.
- Organizations have to manage their organizations horizontally in order to leverage capabilities.
- Horizontal thinking helps break down the barriers between vertical organizations and vertical operations.
- Eventually, everything becomes connected to everything else.

Managing change and addressing the new challenges means looking across organizations—from people to processes to technology—and focusing on the needs of those involved.

The needs

Every system has stakeholders, people who have a legitimate interest or "stake" in what happens and a belief they should be part of the decision-making process, at the very least, consulted in important issues. In a school district, the stakeholders are students, teachers, parents and the community, and district administrators. Interests sometimes coincide. The needs of each group have to be addressed, members of each group have to be consulted, and everyone has to be respected. While others exist, the most important examples are:

- Students want their learning to be personalized. Technology has to be wireless so it travels with them and provides what they want when they want it. What they want is engaging: music, videos, social networking, and collaboration, not to mention "cool" hardware.

- Teachers want students to spend more time on learning, increase their test scores, and be prepared for the future, and they want to make their own lives and administrative tasks easier and more efficient.

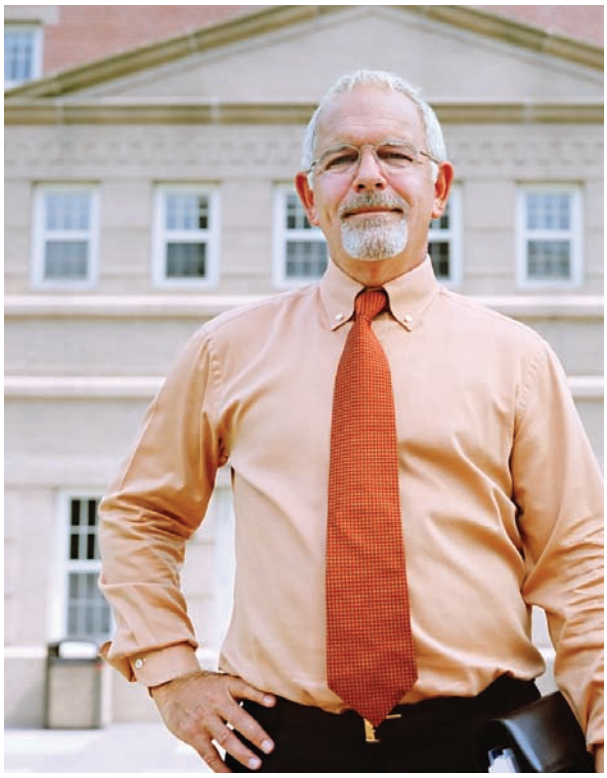
- Parents and communities want to know that students are safe and secure (in school buildings and online), know where they are, and find out how well they're doing from teachers who are willing to communicate.

- School district administrators want to transform the learning experience, increase scores, streamline operations, manage data wisely, comply with mandates and regulations, and manage costs. They also need to be nimble in addressing the needs of the other stakeholders.

Learning

At the heart of educators' work is instilling a love of learning in students. Those who enjoy learning and who know how to keep learning will be prepared for a future in which nothing is certain and the norm is change.

The pursuit of knowledge has never been as exciting as it is today. Computers, the Internet, accessibility to hundreds of thousands of databases all over the world, and the ability to learn in a mobile environment



allow us all to participate in a new paradigm of technology-enabled education.

New technologies enhance our ability to create new ideas, make discoveries, prove our theories, test our knowledge, and realize our dreams like never before. School districts will need intelligent, connected, devices and environments and adaptive, pervasive IT infrastructures.

With them, schools can:

- Offer a choice of learning styles and formats
- Support lifelong learning
- Enable mobility for more flexible learning
- Empower collaboration for research and sharing of best practices
- Build for ongoing change
- Support digital content and services
- Store, access, and manipulate student data for decision making

Solutions

Today's district is wired and seeks to use technology effectively. Networked classrooms and communities provide schools with:

- Secure wireless access from a variety of desktop and handheld devices
- Rich digital media solutions
- Secure, scalable, easy-to-use collaboration with powerful communications and information sharing
- Email, instant messaging, and electronic discussions
- Personal calendars and group scheduling

Integrated collaborative solutions provide schools with management systems for learning and communication among teachers, parents, and the community.

Teachers can:

- Collaborate with students, other teachers, and parents
- Share knowledge and resources
- Use e-learning tools and monitor results
- Customize curriculum and create project-based lessons that address multiple learning styles

Students can:

- Collaborate with other students and teachers
- Get homework assignments and even take tests when they're out sick or use the Internet to research, study, and explore, after school and on weekends

Parents can:

- Monitor homework assignments and attendance
- Track student progress
- Communicate with teachers and administrators

Administrators can:

- Manage data to determine student needs and streamline operations
- Address the changing needs of students, teachers, and parents

"We offer a dedicated education team, a corporate focus on addressing the needs of our education customers, a desire to become districts' committed partner with a comprehensive product portfolio for education and the partners and solutions that will help them make the most of technology."

Joel Coombs
HP's Director of Education

In the following chapters, we will take a look at each of these groups and what they need and demand. And we'll see how school districts can create digital learning environments that prepare students for the 21st Century.

We will also see that one company stands out as committed to education and to the vision of a future where every child is learning to his or her potential.

HP is committed to education as a trusted technology partner with reliable products.

Committed: HP is committed to the education market and is dedicated to providing exceptional care and focus to customer needs. Our dedicated education team understands customer needs and can offer personalized technology and solutions to answer those needs.

Trusted: You can trust HP to provide customers with low-cost, easy-to-use, on-time solutions that provide educators the tools they need to be successful in integrating technology in the classroom.

Reliable: HP's heritage is built on quality and reliability. HP is committed to providing high-quality products and services throughout the life of an educational technology program. HP provides total care to customers, proactively offering a portfolio of services and support that help keep the classroom up and running.

As Joel Coombs, Director of Education at HP says, "We offer a dedicated education team, a corporate focus on addressing the needs of our education customers, a desire to become districts' committed partner with a comprehensive product portfolio for education, and the partners and solutions that will help them make the most of technology."

Chapter 2: Students

Because living and working are so different now from even a decade or two ago and will continue to change, today's students need new thinking, technical, and communication skills to survive and thrive in the future. The Partnership for 21st Century Skills has developed a framework for discussing what education has to do to prepare students. Their elements of 21st Century learning include emphasizing core subjects and learning skills, using 21st Century tools, teaching and learning new content in a new context, and trying new 21st Century assessments.

Education in the future should combine practical, intellectual, and social skills as never before. What does this mean for day-to-day teaching and learning? While students have to demonstrate proficiency in standards-based skills, they also need to show higher order thinking and interpersonal skills. What do they need to be prepared?

Student needs

- Personalized learning environments
- New tools, including individual notebook or Tablet PCs, wireless connectivity, printing needs, and accessories like laptop bags, USB key drives, etc.
- Learning spaces that encourage collaboration
- Project-based learning that addresses state learning standards
- Formative assessment using laptops to get immediate feedback
- Differentiated instruction—adjust learning activities to address varied learning styles and to maximize each student's learning experience

Personalized learning

Young people today expect customization and there is no better way to provide it than with technology. Whether it's their computers' desktop wallpaper or their MySpace profiles, today's young people change the environment to accommodate their needs. When their needs change, it's easy to change the environment too—especially when that is a digital environment.

Schools are traditionally less nimble than we would like, but today, technology offers some wonderful tools and methods to address the needs of learners and personalize their learning experience.

A recent report "Networked for Learning: Enabling 21st Century Student Success" explains:

The ability to personalize and customize the education process, while at the same time participate in a collaborative community of students and educators, is a critical and necessary shift in teaching and learning in the 21st Century. Networked education enables this environment because it is not simply about "integrating" technology into classrooms. It goes beyond bandwidth, addressing fundamental issues such as equitable access and closing the achievement gap. Networked education levels every playing field. Every school in every district can share the same tools and resources, regardless of a school's size or geographic location. Every student can access advanced courses, regardless of whether he or she is planning to enter the workforce directly after high school, or plans to pursue higher education.

From Networked for Learning: Enabling 21st Century Student Success

At the heart of programs that address students' need for customization are 1:1 laptop learning programs. When students have their own computing devices, they become independent learners who can access materials that they need to learn. They can read information at their reading level. They can get answers instantly. They can communicate as they learn. They can create information and share it with others and even work with others online. They can create presentations in whatever medium is best for them. The list is endless. With a laptop, students have the freedom to learn.

So important is this to the entire state of Michigan that they call their laptop learning program "Freedom to Learn." Below is an example of a Michigan district and its mission to individualize learning for its students. Take a look at a New Jersey school that is also focused on personalizing the learning environment (page 9).

Michigan: laptops enrich learning for Caseville students

Ubiquitous access to laptop computers is helping the Caseville Public Schools enrich teaching and learning. Using funding from Michigan's Freedom to Learn program, the district is providing wireless laptops to every student in sixth through 12th grade.

In 2005, the district received $30,000 from Michigan's Freedom to Learn (FTL) Project for sixth grade laptops. Earlier this year, the district received $90,000 from FTL for laptops for all high school students.

The Caseville Public School Board of Education has committed a total of $94,000 to the school's Freedom to Learn program to ensure there would be a laptop for all middle and high school students.

FTL also provided funding for professional development, field services, and project evaluation services.

Teachers can now post assignments and instructions for students to access, and students can send their finished assignments electronically to their teachers for grading. Teachers use the laptops for presentations of difficult concepts and students can follow up by using their laptops to do a variety of enrichment activities, using online supplemental materials and doing research to reinforce their understanding.

According to Leslie Wilson, director of professional and curriculum development for FTL, the program is transforming the classroom into a highly charged, student-centered learning atmosphere where teachers create a media-rich environment. With the emphasis on inquiry and project-based learning, students are also working more collaboratively, moving around, and depending more on one another than the teacher. "They are given permission to interact with the technology and each other in whatever way they need to learn," Wilson says. "It's a much more constructivist environment just by virtue of the fact that these kids are working in their native world."

Teachers report that students are more engaged and that they have fewer motivational problems. Teachers also say that the laptops have saved them time and helped them become more efficient. As they become comfortable with the technology, teachers are experimenting with new ways to use the laptops to support learning in all areas of the curriculum. They are most excited by the opportunity to individualize instruction, using the technology to support a variety of learning styles.

From TechLearning.com

New Jersey: personalized learning

Students at Monsignor Donovan High School in Toms River, New Jersey need innovative technology to help get the most out of their academic experience while extending the classroom environment beyond four walls. That's why the school provides each student with HP Tablet PCs, and requires teachers to use them across the curriculum.

The Tablets have given students better access to their instructors. Some teachers allow students to submit homework and ask questions via e-mail after school hours. Most teachers use e-mail to return corrected homework to students quickly, often recommending ways students can improve weaknesses.

During school hours, classes use DyKnow software to let students take notes on presentations given by their teachers. Meanwhile, teachers can monitor student work and gauge each student's understanding of the topic being discussed.

"More personal attention from teachers keep students focused and accelerates the learning process," says the Eliot Perez, technology director, Monsignor Dovovan High School. "The HP Tablet PCs have inspired our teachers as well as our students. Everybody is a winner."

1:1 computing

Over the years, educators and policy makers, not to mention taxpayers, ask how many computers per student or per classroom are needed. Advocates for different perspectives agree that technology-enabled learning is important and the question is really one of available funds. The ideal has become 1:1—one computer per student, especially laptops, because students can take them out of the classroom for field-based learning and anytime, anywhere access to information. In the real world, adults at work use personal computers individually; they collaborate on projects but do not share computers. There are ways to address this need so that every district can find a strategy.

1:1 isn't just a great sounding slogan. Research verifies that 1:1 computing produces impressive results. Early results from a third-party evaluation of the Michigan program are encouraging. Through a combination of direct observation and surveys, the evaluation found a significant increase in cooperative and experiential learning and computer activities involving critical thinking, plus more student discussion than national norms. In addition, 61 percent of students reported being more interested in learning, 54 percent felt they learned more, and 51 percent believed their increased efforts would lead to getting better jobs in the future. Although achievement results from individual districts are promising, a statewide analysis of results in core subject areas is not yet complete.

"Informal observations have shown that students using the HP Tablet PCs are excelling in this environment, particularly in our special-ed and ELL (English language learner) student populations, where the technology levels the playing field."

Dani Pfeiffer
Assistant Principal
Kent Technology Academy

Another example is the Kent School District, near Seattle, Washington. The district chose the HP Tablet PCs as part of a program to put computing power in the hands of each of its 27,500 students. The program is designed to motivate students, including those who struggle in class or are uninspired. The school system is determined to meet today's demanding achievement standards and better prepare the students for successful adult life. The approach means equipping middle and high school students in the district with an HP Tablet PC over the next four years.

For example, the Kent Technology Academy is the district's proving ground for making Tablet PCs part of each student's learning tools and each teacher's lesson plans. Opened to students in the fall of 2005, the Academy brought together a diverse group of 90 seventh-grade student volunteers from across the district into Mill Creek Middle School, one of the district's lowest-performing schools.

According to Dani Pfeiffer, Kent's Assistant Principal, "Informal observations have shown that students using the HP Tablet PCs are excelling in this environment, particularly in our special-ed and ELL (English language learner) student populations, where the technology levels the playing field."

Online class materials and Internet access put a vast amount of information at students' fingertips when they need it. Instant messaging and online forums let study- group members communicate, even if some members are in another classroom or sick at home. And students like the flexibility of using the Tablet PC to type class assignments or write in longhand.

So far, the district finds that students are more engaged in schoolwork; their performance has improved, and students are better prepared to use technology wisely. Teachers have found greater flexibility to personalize lesson planning.

How to start

Because today's digital natives (our students) will benefit, now is the time to create an interactive personal learning environment, and it can begin with HP's 1:1 Computing Program. To address the fast-paced and technology-center learning styles of students, schools can improve student engagement, increase achievement, and facilitate learning by implementing a technology solution that gives today's students the tools they need to succeed in education and their lives.

HP has a proud history of high quality and reliable computing products, but the 1:1 program is more than just computer hardware. It's a comprehensive package of educational software, training, and support, with all the quality and reliability you would expect from HP. For more detail, see HP's 1:1 Computing Program components (page 18).

Becoming wireless, mobile, and paperless

Located on the east side of Columbus, Ohio, Bishop Hartley High School is a private Catholic school but a mirror image of the entire city. The 45-year-old school has nearly 600 students comprising a diverse collection of races and socioeconomic classes.

As the regional training center for the schools of the Diocese of Columbus, which includes 46 elementary schools and 11 high schools, Bishop Hartley is the first school in the diocese to use the Compaq Tablet PC TC1000 to help fulfill the diocese's stated goal of empowering students to mature spiritually, morally, intellectually, physically, and socially.

Their challenge was to implement a wireless, mobile, paperless infrastructure for seniors based on intuitive technology, available to students 24x7 from any location. The solution they chose was 160 HP Tablet PCs, HP LaserJet printers, 80 notebook PCs, and 30 desktop PCs.

The results were an increase in students' enthusiasm for learning, improved student organizational skills, the opportunity for educators to concentrate on content over delivery, 24x7 access to work, and a reduction in the use of paper.

Kenneth Collura, director of technology for the Diocese of Columbus, says, "I see the future with Tablet PCs in every classroom, with every student, and every teacher."

The computer as a tool

The computer is a tool. Just as a ruler helps a student measure, a protractor helps calculate the degrees in an angle, and a pencil and pad assist in the capturing of ideas, so a computer assists our children in creating, manipulating, and producing various pieces of work. There is no magic formula for producing results in our students. In order for our children to succeed it will take good teaching combined with good tools. The computer can either be used properly and produce great results or improperly producing disastrous consequences depending upon who wields the mouse.

Imagine, if you will, the technology-rich classroom. Every child is equipped with a Wi-Fi capable firewall-protected laptop. There are Bluetooth-enabled peripherals, such as printers, scanners, and projectors. There are also hand-held computers and every other possible technological advantage.

Imagine the room with a well-prepared teacher, grounded in pedagogy, and knowledgeable about technology. Whether novice or veteran, the possibilities are endless. The Internet CAN be used not only for static research but for real-time data. Envision a project where the children can chat with experts in various fields or e-mail their opinions to children in other countries, testing hypothesis online and sharing information.

They can then create PowerPoint presentations from this research. They can send drafts of information to their teacher for immediate feedback. They can create charts and graphs. They can enhance their writing by using a laptop and the writing process. They can use Word to do their drafting.

They can e-mail their information to their teacher for assistance with editing and revising. The teacher can communicate by adding comments to their work and sending it back to the student. Finally, the students can print a final copy or turn their work into a Web page. There can be peer-to-peer conferencing without the students ever leaving their seats, and that is just the beginning.

From TechLearning.com
By Terry Woolard

Learning styles

Students are individuals and as such they comprehend, interact with, and process information differently from one another. Some students understand things based on skills of analysis, reason, and problem solving. Others understand better by sensing and imagining. Some need to see; others to hear, and yet others to touch. Targeting materials to students' learning styles makes it easier for them to understand the information.

Teachers can present the same material in different ways.

For example:

- **Visual learners** learn through seeing. They rely on visual cues from other people or visual aids such as diagrams and videos. Clearly, computers are best at providing visual learners with materials in the way they like to learn.

- **Auditory learners** learn through listening. They get their cues from explanations and tutorials. Online, they can hear discussions, lectures, and almost any information. They can understand by listening over again if they chose.

- **Tactile/Kinesthetic learners** learn through doing and touching. They learn best with hands-on activities. Interactive materials online provide them with just the right way to learn.

Engaging students

A recent Project Fair at Hale Middle School in Michigan demonstrated the results that can be achieved when students take on highly challenging but personally meaningful activities. Projects ranged from a miniature anemometer to a device to help visually impaired students open and secure their lockers.

Students picked their projects from a set of individualized recommendations that takes into account their academic strengths, interests, and learning-style preferences. It's all part of the school's online program that matches students' interests and learning styles to many different opportunities designed to provide enriched, challenging learning.

From TechLearning News

With today's drive toward inclusive classrooms, students present a wider range of abilities, skills, languages, and learning styles than ever before. How can teachers address the needs of all? The answer is differentiated instruction, grouping students with similar abilities and needs and providing appropriate learning activities to maximize growth.

Thanks to the Web, teachers can assign research projects, confident that there's an abundance of information at students' fingertips. Students like doing research online; they can focus on complex topics and create thorough and thoughtful reports. For elementary students searching for simple texts and images to high school students looking for sophisticated data, the information is available online.

Six key elements of 21st Century learning

Core subjects: The authors reaffirm the importance of the core subjects identified by No Child Left Behind but challenge schools and policymakers to expand their focus beyond "basic competency" to understanding the core academic content at much higher levels.

Learning skills: "To cope with the demands of the 21st century," the report states, "students need to know more than core subjects. They need to know how to use their knowledge and skills—by thinking critically, applying knowledge to new situations, analyzing information, comprehending new ideas, communicating, collaborating, solving problems, and making decisions."

21st Century tools: Recognizing that "technology is, and will continue to be, a driving force in workplaces, communities, and personal lives in the 21st century," Learning for the 21st Century emphasizes the importance of incorporating information and communication technologies into education from the elementary grades up.

21st Century context: Experiences that are relevant to students' lives, connected with the world beyond the classroom, and based on authentic projects are central to the sort of education the Partnership for 21st Century Skills defines as the appropriate context for learning in the information age.

21st Century content: The report's authors believe that certain content essential for preparing students to live and work in a 21st century world is missing from many state and local standards.

New assessments that measure 21st Century skills: "As pervasive as assessment seems to be today," the report says, "it remains an emerging and challenging field that demands further study and innovation." Recommendations include moving beyond standardized testing as the sole measure of student learning; balancing traditional tests with classroom assessments to measure the full range of students' skills; and using technology-based assessments to deliver immediate feedback.

From Learning for the 21st Century

21st Century skills

As much as students need to learn academic content, they also need to know how to keep learning—and make effective and innovative use of what they know—throughout their lives. The Partnership for 21st Century Learning, a public-private coalition, articulates a vision of how schools can best prepare students to succeed in the first decades of the 21st century. According to them, the new skills are comprised of:

- Critical thinking and problem solving skills
- Communication skills
- Creativity and innovation skills
- Collaboration skills
- Information and media literacy skills
- Contextual learning skills

The only way for students to acquire these skills is by using technology. In fact, the Partnership, in the report "Learning for the 21st Century," recommends as key elements that schools use 21st century tools to develop learning, teach and learn in a 21st Century context, and teach and learn 21st Century content.

Help is on the way: One-to-One Institute

The One-to-One Institute, funded by HP, is a national non-profit organization to help transform schools into high-performing, student-centered and technology-rich learning environments. An outgrowth of the successful Michigan Freedom to Learn initiative, it has special expertise in serving high priority and high poverty schools. http://www.one-to-oneinstitute.org

Tools and content

There are many examples of student learning with technology. From doing individualized assignments to researching information online and creating presentations, students are engaged in learning content when they have the right tools.

For example, At Hale Middle School, in Michigan's rural Iosco County, the laptops are used in all curricular areas. While students are not allowed to take the computers home, they are used extensively in a special curriculum. Recently, seventh-graders were writing a two-page letter about the dangers of drug use and preparing a PowerPoint presentation of their findings. They had gathered the data they needed to make their cases by visiting a variety of anti-drug Web sites, which they accessed using the wireless network provided their school as part of Michigan's Freedom to Learn program. Teachers and administrators believe the program has been very successful.

Multimedia

The value of rich, multidisciplinary, technology-infused learning seems obvious to educators who have seen its impact on young people. In all classrooms, adding these creative new tools results in students learning higher level thinking skills in order to share what they have learned. For example, using an in-school studio, Brian Reedy's students at Carson High School have produced impressive videos warning peers of the dangers of drug addiction and unsafe driving. Their studio is equipped with an HP Server and a dozen HP Workstations equipped to handle complex video editing tasks.

21st Century content

How is education different now? For one thing, content is different. Students have to learn much more than ever. In addition to basic skills, they have to be competent in the following:

Global awareness

- Using 21st Century skills to understand and address global issues
- Learning from and working collaboratively with individuals representing diverse cultures, religions, and lifestyles in a spirit of mutual respect and open dialogue in personal, work, and community contexts
- Promoting the study of languages other than English as a tool for understanding other nations and cultures

Financial, economic, and business literacy

- Knowing how to make appropriate personal economic choices
- Understanding the role of the economy and the role of business in the economy
- Applying appropriate 21st Century skills to function as a productive contributor within an organizational setting
- Integrating oneself within and adapting continually to our nation's evolving economic and business environment

Civic literacy

- Being an informed citizen to participate effectively in government
- Exercising the rights and obligations of citizenship at local, state, national, and global levels
- Understanding the local and global implications of civic decisions
- Applying 21st Century skills to make intelligent choices as a citizen

Source: Learning for the 21st Century

1:1 classrooms

Within one-to-one teaching and learning environments, students engage their natural, close technology-rich habitat to meet educational and personal achievement goals. Research demonstrates that student engagement, motivation, time on task, and self-directed learning improve when a prescribed curriculum is taught in an environment in which personal, portable technology has been effectively integrated on a one-to-one basis.

A one-to-one environment causes teachers to change their pedagogy to create student-centered, constructivist environments where technology allows students to be self-directed learning leaders, often teaching their teachers how to use and troubleshoot the technology.

To be effective, one-to-one teaching and learning must attend to a structured, systematic process of change that will transform learning from teacher-centered to student-centered. Advanced planning, teacher and staff preparation, professional learning, technology infrastructure, and assessment and evaluation are strategic elements of a one-to-one program.

Changing a school environment from teacher-centered to student-centered takes time, patience and attention to detail. Schools that have been most successful to date have been especially attentive to upfront planning, inclusion of all stakeholders in decision-making, and powerful communications to all stakeholders before and during this long-term process of change.

No one is an expert at this yet. We are all learning from each other as we move toward the day when the integration of ubiquitous personal, portable technology is no longer viewed as an isolated, episodic event in teaching and learning environments.

From TechLearning.com
By Leslie Wilson

Software solutions

Software such as DyKnow Vision™ encourages interaction through collaborative note taking, student response tools, content replay, and anywhere, anytime access.

There are real benefits for students who use DyKnow Vision: Teachers can send their presentation notes to student computers so students don't have to take notes, and they can use pen-based technology with the tablet to add their personal comments to the class notes. They can replay class content later to review exactly how answers were derived. Other key points are saving presentations with their personal notes, collaborating with teachers and peers, and electronically submitting and receiving homework grades and immediate feedback.

Applications such as Microsoft's make a big difference. Students use Office to create documents, spreadsheets, and presentations. OneNote allows students to use pen-based technology and a tablet to gather information in one place, find what they need fast, share notes and information, and convert handwriting to text.

Multimedia and creative tools from Adobe help students learn in new ways, manipulate information in various forms, and share compelling presentations. From photo editing to movie production to online collaboration, students interact with professional tools and learn the skills they will need as adults in this global environment.

A collection of other tools and materials is in the HP Learning Packs that can be loaded onto every laptop to provide grade-appropriate software for elementary, middle, and secondary school students. These include multimedia, tools, and activities.

There is a lot that is new for students as well as for everyone else, and teachers have to make sure that students are always on task. DyKnow Monitor™ provide a bird's eye view of student monitors so teachers can be sure that students are always on task.

Collaboration

One other skill that students need is the ability to work collaboratively on projects with others, some of whom are located elsewhere. Using the Web, e-mail, instant messaging and Internet telephony, they can reach out into the world. With technology, students can work in small groups wherever they happen to be and at any time. Education doesn't have to end as the bell rings at 3:00.

They can continue learning online if they use such software as DyKnow Vision. They can go online from anywhere and work together, even collaborating on taking notes for projects. They can even reconstruct how charts were built and concepts were introduced.

School, district, and classroom Websites
Students can research, collaborate, create and post projects online, access primary sources, and search for ideas on almost any topic. Using technology is second nature to today's learners. Students do research willingly, and know that getting help with homework and reports are among the key benefits of being online. Many schools have Web portals to provide easy access to information and coursework, assignments, grades, content, teachers, and outside experts.

Leveling the playing field
Online access to resources and information, research, exploration, communication, etc. beyond typical hard copy school resources makes the difference for this generation of learners and may level the playing field for students who traditionally would not have ready access to information, tools, materials, and the technology to learn 21st Century skills.

What we need to do to prepare students for a world that is vastly transformed by technology. It is necessary to constantly learn and adapt 21st Century tools—including computers, telecommunications, and audio- or video-based media—that are critical enablers in a number of realms. And the fact that the information age that has resulted from the widespread adoption of such tools places us in a world of almost unlimited streams of trivial and profound information, of enormous opportunity and difficult choices, necessitates an emphasis on information and communication technology literacy skills that will allow all students to make sense of it all.

When Michigan launched its Freedom to Learn program in 2003, it hoped to distribute free laptop computers to all the state's middle school students. Economic constraints caused the state to limit its efforts to "high need" schools, those serving high poverty students who were having problems making adequate yearly progress.

Currently some 28,000 students in 100 school districts are participating in the Freedom to Learn program. The laptops are helping schools expand their curriculum and better prepare students for life in the 21st Century.

Bruce Montgomery, former executive director of the Freedom to Learn program, says that schools involved in the program are beginning to realize that by capitalizing on students' affinity for computers they can open up new possibilities for educating children.

Technology as a bridge
Technology bridges school and students' lifestyles. As we pointed out, they rely on technology because they have never known a world without it. Schools must use technology to engage today's students. Technology is also a bridge to their future. With its use, they can acquire the skills they need to be productive adults. A new report, called the Horizon Report from the New Media Consortium and EDUCAUSE mentions six technology trends that educators should watch. These are:

- User-created content
- Social networking
- Mobile phones
- Virtual worlds
- New scholarship and emerging forms of publication
- Massively multiplayer educational gaming

(*From The Horizon Report*)

Engaging learners

Public schools in Las Cruces, New Mexico, made learning exciting again for students, while improving retention and classroom performance.

They began with a seventh grade laptop initiative, equipping every student with an HP Notebook PC for use through high school graduation. Students had been less than enthusiastic about learning until the district began integrating computing in the academic curriculum to facilitate inquiry-based, hands-on learning. Teachers learned how to be coaches and mentors. They also added ABC-RV mobile classrooms with HP Notebook PCs.

They developed new technology-based curriculum units in math, science, English, and social studies. The results included reducing student dropouts by 50% in historically worst-performing schools. They enrolled more at-risk students and community outreach improved.

Technology also bridges equity issues. As students become more and more immersed in all things digital, schools must adapt and use the same tools and techniques that students use at home. The world becomes their 21st Century learning environment.

In Kershaw County School District, three amazing things happened soon after laptops were given to the students. First, the same day that the kids received their machines and completed the basic training, they returned to the classrooms and engaged immediately in PC-based lessons, because the teachers felt comfortable and confident with the technology. Second, the equipment leveled the playing field between regular students and special needs individuals, giving them a similar range of skills on the PCs. Third, it also brought about equality from a socio-economic perspective since everyone has the same equipment regardless of parental income, and all ninth graders have the tools to complete assignments and homework, so that parents can stay involved.

HP's 1:1 Computing Program

Today's students are in the first generation to have grown up immersed in technology. Combine their digital savvy with the requirements of the "No Child Left Behind" Act, and your need to use technology so that students learn both basic and 21st Century skills has never been greater.

HP's 1:1 Computing Program is an all-in-one solution. From PCs that ship with educational software to training, support, and financing, this program gives you everything you need to fulfill the promise of one-to-one learning and provide educational opportunities in and beyond the classroom. It is HP's goal to help educators, administrators, and students benefit from a 21st Century learning environment.

Notebooks and tablets—HP professional grade notebooks and Tablet PCs offer a balance of sophisticated technology and wireless mobility for today's students. HP's reliable, lightweight mobile products foster collaboration and provide anywhere access to Web-based resources and communication tools that help students to develop 21st Century skills. In addition, Tablet PCs provide smart computing capabilities such as handwriting recognition, which is perfect for such things as field trip notetaking.

HP Care Packs—HP Care Packs provide high-quality remote assistance and onsite support for hardware, helping you to improve product uptime. Service highlights include remote problem diagnosis and support, onsite hardware support, and service-level options with different coverage windows and response times.

1:1 computing accessories—USB drives, mouse pads, laptop bags, extra battery packs, and more.

HP Education Services—HP has two options for classroom curriculum content depending on grade level requirements.

- Connected Tech™ is a K-8 Web-based instructional program that teaches students technology skills within the context of the core curriculum. It provides educators with a solid model for technology-integrated, standards-based, lesson plans and delivers content-driven technology integrated instruction to students, such as tutorials, lessons, projects, online or offline learning for home and school, and differentiated instructional approaches to accommodate learning styles.
- Curriculum Pathways® is a solution that provides tools and support that help teach to a standards-based curriculum, prepare students for college-level learning, instill 21st Century skills, and meet achievement and accountability criteria. Built in accordance with the way students learn, the online product provides a wealth of resources in English, Spanish, science, math, social studies, and Spanish (grades 8-12).

Software solutions:

HP Learning Packs—With the direct purchase of any HP desktop, notebook, or Tablet PC, K-12 education customers can receive HP Learning Pack software at no additional cost. Each HP Learning Pack includes grade-level and subject-specific software in areas such as multimedia, arts, adventure activities, teacher tools, and trainings.

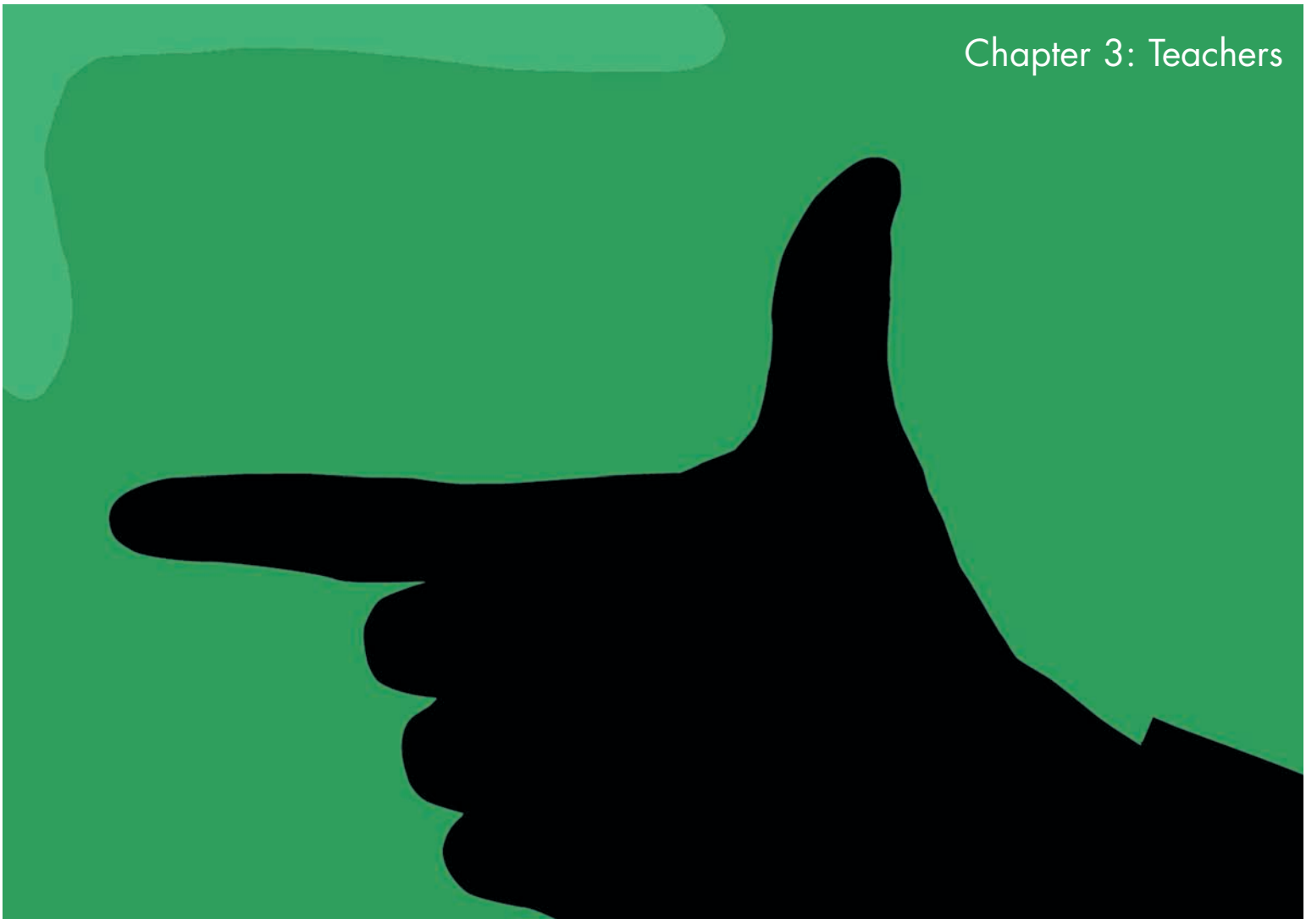
DyKnow - DyKnow Vision™ allows students to concentrate their note taking on solving problems, clarifying concepts, and making new connections. Later, they can play back their notebooks and see stroke-for-stroke how concepts were introduced. Teachers can use it to instantly transmit content to student computers for personalized annotation and use response tools to facilitate formative assessments.

Absolute® Software—Absolute Software's Computrace® is a guaranteed computer theft recovery, secure asset tracking, and data protection solution. Based in the BIOS* firmware of all HP notebooks and tablets, Computrace allows IT professionals to track stolen or missing computers, inventory computers district wide, and detect changes in hardware and software.

Microsoft Office and Microsoft OneNote—Microsoft Office is the suite of productivity applications used by businesses and schools. Students can write essays and reports with Word, do the math and create graphs and charts with the Excel spreadsheet, organize lists and other data with the Access database, create presentations with PowerPoint, and communicate via email with Outlook. With OneNote, students can take notes, gather information, and collaborate with others. It is most powerful on a Tablet PC using the tablet's pen and ink capability, it can also be used on a notebook.

Information subject to change without notice.

Chapter 3: Teachers



Teachers want what is best for their students. In today's world, that means helping them acquire both basic and 21st Century skills. Standards-based curricula provide the traditional foundation of content, and approaches like project-based learning provide more of the critical thinking and problem solving skills. Integrating technology, for example with multimedia tools, helps guide students into developing creativity and innovation skills.

Digital learning environment

Technology can help students learn all of the needed skills. By encouraging students to use computers to read, write, share, and present, teachers promote communication skills. By providing access to the Internet, they promote research, information, and media literacy skills. They promote collaboration skills by encouraging students to work together with peers, teachers, and experts inside and beyond their classrooms. Teaching with project-based learning and technology tools helps students to analyze, synthesize, and apply information and acquire problem-solving and contextual learning skills.

Having ongoing access to their own laptops in and out of school puts students into the environment they need to learn for the future. Laptops make teachers lives easier too – between being able to access resources, improve productivity, and decrease the burden of administrative tasks.

Of course, districts have to provide ongoing professional development and support in order to sustain this type of environment because teachers have to be comfortable in it and know why technology makes a difference. One educator explains his reasons for integrating technology in the sidebar "Eight reasons to teach with technology."

Eight reasons to teach with technology

Reason 1: expand time and place

In a typical high school a student has access to a teacher one hour per day. That means she has access to the teacher 6% of her waking day, and even that time is shared with 25 classmates. She has access to the Internet 100% of the time. That's 20 times better. Technology is no substitute for an inspiring teacher. However, on-line materials are FAR more available. Twenty times more.

Using the textbook + classroom approach, the places where learning can occur are limited. A portable wireless computer has access to the teacher's course material and the entire Internet almost anywhere. And this is a vastly larger resource than can be practically carried on paper in a backpack. The bottom line is that information technology allows learning anywhere, anytime; not just in one particular classroom for one hour a day.

Reason 2: depth of understanding

Interactive simulations and illustrations can produce a much greater depth of understanding of a concept. When virtual manipulatives are used in a classroom setting they can go far beyond chalk and talk. Using a projector, the teacher can conduct onscreen investigations and demonstrate concepts far more easily than with just words and arm waving. Combine this class demonstration with access to the same tools over the Web, and the student can reinforce the ideas by playing with the simulations themselves, any time, anywhere.

Reason 3: learning vs. teaching

Technology allows the tables to be turned. Instead of teaching (push), students can be given projects that require them to learn (pull) the necessary material themselves. Key to this is the ability to get the information they need any time anywhere, without being in the physical presence of a teacher.

Reason 4: self-expression

In the old days, students could write in a notebook, and only the teacher saw what they wrote. Using modern technology they can: Make a PowerPoint presentation, record/edit spoken word, do digital photography, make a video, run a class newspaper, run a Web-based school radio or TV station, do claymation, compose digital music on a synthesizer, make a Website, create a blog.

Reason 5: collaboration

A vital skill in the new digital world is the ability to work collaboratively on projects with others who may not be physically close. This can best be done using modern computer tools such as the Web, e-mail, instant messaging, and cell phone. Rather than laboring alone on homework, students can work in small groups wherever they happen to be and at any time.

Reason 6: going global

We can expand students' worldview because of the zero cost of communicating with other people around the globe. The Internet permits free video conferencing which permits interaction in real time with sister schools in other countries to understand other cultures through direct dialog and collaboration.

Reason 7: individual pacing and sequence

Students are, of course, all different. Information technologies can permit them to break step with the class and go at a pace and order that suits their learning styles. Without disrupting the class, they can repeat difficult lessons and explore what they find interesting. With time, it will become more like having a private tutor rather than being lost in a large class.

Reason 8: weight

Three textbooks and three binders easily weigh over 25 pounds. A laptop computer weighs a few pounds and provides access to infinitely more material via its own storage and the Internet. A 40Gb hard drive can hold 2 million pages with illustrations; the web is vast.

From TechLearning.com
By John Page

Digital classroom solution

Making HP a partner in your technology program will enhance students' learning experiences with a digital classroom solution. In addition to personal systems, such as laptops or tablets, HP can help you build a 21st Century learning environment that is truly digital and modern. From leading-edge hardware and educational software, HP's Digital Classroom program brings together a customized program with products and partners that will change the way students learn and teachers teach.

The program includes leading HP and partner products—PCs, printers, projectors, wireless networking products, interactive whiteboards, accessories, software, partners, implementation support, professional development and financial services. As Thuan Nguyen, director of project management and technical services in the Kent School District says, "Because of the access and experience they have, we made them part of our problem solving. HP came back with recommended technologies."

Digital classroom benefits:

- Improve student engagement and achievement
- Improve teacher efficiency and effectiveness
- Foster collaboration—student to teacher; resource sharing among faculty
- Easy access to technology, data, assignments, grades, content, research, administration, parental communication
- Professional development and student technology training
- Technology bridges school and lifestyle/home; prepares students with 21st Century skills; levels playing field for all students; improves parental communication
- Standards-based curriculum delivered with 21st Century tools
- Improves productivity; decrease administrative tasks burden

Improving student engagement and achievement

Teachers understand that students need an educational environment that relates to the way they like to learn, which in today's world is increasingly dependent on technology. When the classroom addresses these needs, students are engaged and the result is increased achievement.

For example, the Kent School District, south of Seattle, Washington, faced the educational challenges of motivating students and preparing them for success in the 21st century. One way the district addressed these challenges is with a long-term educational plan that included equipping thousands of secondary school students with HP Tablet PCs.

"During planning, I had my doubts about whether the program would be beneficial," Nguyen says. "Those doubts were erased when I saw how the Tablet PC helped improve traditional classroom teaching."

"The increased ability of teachers to personalize education for their students through the use of the HP Tablet PC is a key reason for the improved results," says Assistant Principal Dani Pfeiffer, "Informal observations have shown that students using the HP Tablet PCs are excelling in this environment, particularly where the technology levels the playing field."

They wanted to motivate students and prepare them to succeed in a technological society. They equipped every middle- and high school student in the district with an HP Tablet PC over four years. Students became more engaged in schoolwork, improved academic performance, and were better prepared to use technology in adulthood. Teachers gained more flexibility to personalize lesson planning.

In other districts with HP 1:1 programs, results point to improvement in student attendance, individualized instruction, cost savings, and Adequate Yearly Progress (AYP) goals.

In Las Cruces, New Mexico, the district has developed new technology-based curriculum units in math, science, English, and social studies. Student attrition was reduced by 50% in historically worst-performing schools. They improved community outreach and enrolled more at-risk students.

In Michigan's statewide Freedom to Learn program, attendance increased and student test scores improved as part of AYP goals. Bruce Montgomery, the program's former Executive Director, says, "HP is truly a partner in bringing 1:1 wireless learning to children throughout Michigan. It is dedicated to helping us improve education."

What else does it take to achieve gains? In addition to using their HP Tablet PCs, teachers in these districts provide access to HP printers, wireless projectors, interactive whiteboards, mobile carts, and USB keys for sharing data. Using familiar tools, teachers can reach today's digital generation. See "Reaching today's children" below.

Greater instructional reach

To provide the teachers in high schools greater instructional reach, the Hillsborough County School District installs laptops on mobile carts to allow them to be rolled into the classroom for class instruction when they are needed. In addition, one desktop PC is permanently installed in each classroom for the teacher's use. The middle schools have opted for a combination of some desktop PCs in the classroom and laptops on mobile carts. The elementary schools typically have a dedicated computer lab, laptops for the teachers, and one or two desktop PCs in each classroom for student use.

Finding resources

With their busy schedules, teachers need to find information and teaching materials quickly. Websites provide resources and links for every subject area, and teachers can download lessons, activities, and projects to use in their classrooms. They can communicate with peers online and post assignments for students and parents on school Websites. In addition, online courses are a convenient way for them to get professional development.

Classroom management

Teachers have to know that students are on task and working at optimum performance. Using technology could be challenging with a classroom full of students, so teachers turn to software to control content, connect students, and supervise their work.

For example, teachers can use distributed learning applications to synchronize learning content and collaboration from learning and course management systems and make it available so that students can continue their learning anytime, anywhere.

Reaching today's children

Youngsters today occupy their time with high tech toys and games. Sometimes it seems as if it doesn't require batteries or electricity, it isn't worth their time and effort. Gone are the days of "reading just for the fun of it." For many (although hopefully not all) students today, books have become something that is 'boring'—something viewed as more like work than play.

This has created a challenge for educators. Children's attention spans are no longer what they used to be; and this alone has made the job of teaching more challenging. Understandably then, the ability to reach a child and retain his/her focus through the use of traditional teaching tools like the textbook and chalk board has vanished in many classrooms.

While technology can be blamed for creating this new challenge for educators, this same technology has become an educator's dream. The Internet has transformed the teaching experience by connecting classrooms around the world to the world. Children who seldom if ever leave their neighborhood, be it urban, suburban, or rural, are now able to visit places around the globe. Computer manufactures have made significant improvements to computers—and now monitors display the most vivid and vibrant colors and images, and audio systems project the most dynamic sounds.

The sheer ability to connect to the outside world has brought remarkable results for educators by giving them a new way to captivate minds, hold attention spans, and engage children in the learning process. This is no small advancement in education. Indeed it has created a magnificent change in learning by making it possible for educators to do more than teach a handful of children—they can now reach an entire classroom by appealing to the senses that help spark imagination and creativity.

As globalization continues to increase and expand its tentacles into every aspect of society, our world continues to shrink. Internet and computer technology has provided educators with advantages to helping prepare children for the world by exposing them to communities and cultures beyond theirs. By reaching these children it is possible to teach them about the urgent problems that our world faces today, whether it's the struggle to prevent the Loggerhead turtle from extinction or the AIDS epidemic in Africa.

Technology has made it possible to put into classrooms windows to the outside world, and this has given educators a new tool by which to keep children engaged in learning as well as keep them connected to the world in which they live.

From TechLearning.com
By Tracie Linderman

Distributed learning applications get around limitations of Web-based learning management (LMS) and course management systems (CMS) that require a network connection.

Teachers also want to determine student interaction. For example, DyKnow Vision, a great tool for collaboration, fosters interaction through collaborative note taking, student response tools, content replay, and anywhere, anytime access. Teachers can transmit to student screens, and students can personalize the content with their own handwritten notes.

Similarly, teachers want to monitor student work. For that they turn to DyKnow Monitor™, which offers a flexible way to keep a bird's-eye view of student computers. Like other computer monitoring and control applications, teachers can use DyKnow Monitor to view thumbnails of student screens, block Internet browsing and other distracting applications, and blank student screens. They can monitor lab and mobile computers using class rosters, computer locations, or both to identify students. They can monitor computers in wired and wireless environments.

Collaboration

Collaboration portals provide secure, scalable, easy-to-use collaboration with powerful communications and information sharing including e-mail, instant messaging, electronic discussions, personal calendars and group scheduling, and rules-based message management.

These integrated collaborative solutions provide schools with communication between teachers, parents, and the community and knowledge management and e-learning. With it, teachers can collaborate with other teachers and with students, share knowledge and resources, and use e-learning tools.

The advantages extend to students, who can collaborate with other students and teachers and get homework assignments and even take tests when they're out sick. Parents can monitor homework assignments or attendance, and track student progress.

Easy access

The appeal of the digital classrooms is that students can access the resources they need and teachers can have easy access to information, teaching materials, colleagues, data, assignments, grades, content, research, and more. As part of this new classroom environment, teaching the fundamental skills changes with the times. In today's world, teaching the good old "3 Rs" takes on new meaning—and we add a new basic.

The new Rs—now there are 4

Reading—exposing knowledge

In the old days (when we were growing up), if we could read and understand the text handed to us by teachers, librarians, and publishers, it meant we were literate. Today, our students typically begin their information experiences in front of a global electronic library of billions of pages of information, where materials can be published by just about anyone, on just about anything, and for just about any reason.

If our students have been taught only to read and understand this information, they could be in serious trouble, possibly even in danger. Accessing information in an increasingly digital and networked world requires a range of skills of which decoding text is only a small part.

Basic skills for today's students include the following:

- **Finding information:** Locating relevant information not only from a local library or newsstand, but also from the Internet. Literacy includes the ability to identify needed information, use Web searching tools to find it, and employ research strategies that expose the best information.
- **Decoding information:** Beyond decoding text, literacy requires reading deeply for meaning in multimedia content.
- **Evaluating information:** It is critical that students learn to evaluate the information they encounter, and also identify its value in terms of their goals.
- **Organizing information into personal digital libraries:** A key strategy for handling the overwhelming amount of information available to us is the construction and cultivation of personal digital libraries. When we create and organize information that is relevant to our ongoing interests and goals, then we can handily find answers to our questions.

Arithmetic—employing information

Again in the old days, numbers were used as a way of measuring our environment and the laws that governed it precisely and to manipulate that environment and its laws in order to add value to our lives.

Today, just about all information is expressed in the universal language of numbers. Multimedia content is stored and communicated as ones and zeros, otherwise known as binary code. Since information is expressed in numbers today, and personal computers are available for interpreting and modifying those numbers, it becomes raw material that can be analyzed, altered, and improved in pursuit of a goal. It becomes just as important to be able to use a computer to process the invisible numbers behind images, audio, and video content as it is to be able to add, subtract, measure, count, and calculate the visible numbers.

Learning to process any and all information requires:

- **Basic mathematical skills:** As always, students must know how to add, subtract, count, measure, and calculate numbers. They must also understand the fundamental laws of numbers and how to use these concepts to answer questions, solve problems, and accomplish goals.
- **Computer-aided processing of numbers:** Of the numerous exabytes of information that will be generated this year, only a small percent of it will be printed. The rest will require a machine to read it. Students, while they learn the basic skills of processing printed numbers, must also learn to process large quantities of digital numbers using computer spreadsheets and other data processing tools.

continued on the following page

- **Processing media:** Because of affordable digital cameras, scanners, MIDI music devices, and the vast array of multimedia content available on the Web, obtaining or creating the picture (or sound) is no longer the final outcome. It is merely a part of the process. All formats of information can be moved into powerful graphic, sound, and video processing software and altered to communicate in a more precise and compelling way. Students must learn to use these software tools in order to add value to information. It's all about numbers, but also about using computers to process those numbers in order to improve the delivery of information and accomplish goals.

Writing—expressing ideas compellingly

In a world bursting with information, we can use only the information that is successful in competing for our attention. And there is a lot of it online. The information we select will be what looks the most appealing, seems to communicate itself most effectively and efficiently, and appears reliable and authoritative.

Writing will continue to be a core skill for all students, because some information is simply communicated most effectively in text. However, other information might best be expressed using pictures, sound, animation, or video. Students must master a range of practical and technical skills involved in expressing ideas effectively and compellingly.

- Writing effectively: Students must learn not only the mechanics of writing, but how to use text to communicate knowledge and ideas more efficiently than ever.
- Communicating with multimedia: Students must also learn to match their message with the medium that best communicates it, and then use the appropriate tools to create and or modify it in order to attract the attention of an audience.

Ethics: right and wrong on the Information highway

As information becomes increasingly important to our economy and culture, it also becomes more powerful—able to accomplish enormous good and great harm. This is why it is essential that at the same time we teach our students these prevailing information skills, we also teach them the ethical use of that information.

- Information reliability: Students must learn to assess the accuracy of the information that they access and use, and it is equally important for them (and for all of us) to provide evidence of the accuracy and reliability of the information products they assemble.
- Information property: In the information age, we are all information property owners. Most of us will make our living by producing information products. It is important that students gain an appreciation of information as property that needs to be respected in the same way that we respect each other's material property.
- Information infrastructure: Today, we depend on the computers and networks through which our information flows to no less degree than we depend on our roads, rails, waterways, and airports. Planting a virus on a network is just as destructive as planting a bomb under a bridge. Students must realize the importance of our information infrastructure and how critical it is to our success in the future.

From Technology & Learning
By Sara Armstrong and David Warlick

Differentiated instruction

School systems today recognize that students who are grouped together may have very different skills and learning styles, not to mention reading levels and languages. Teachers are charged with educating all of their students to maximize their potential. One strategy educators use to address student differences is differentiated instruction, in which they group students who have similar abilities and provide them with the most appropriate learning activities.

Thanks to the Web, teachers can assign research projects, confident that there's an abundance of information at students' fingertips. Students like doing research online; they can focus on complex topics and create thorough and thoughtful reports. For elementary students searching for simple texts and images to high school students looking for sophisticated data, the information is available online.

In addition to having access to the Web, technology provides other ways to teach using differentiated instruction. For example, using a handheld device, a teacher gives a pop quiz, monitors the students' answers, compiles grades, analyzes the areas with the lowest scores, and re-teaches that lesson—all in the same class period.

Professional development

Professional development is crucial to an effective technology program. It includes preparing teachers to use technology to support standards-based teaching, student-centered learning, and using more effective strategies to reach today's "wired" students. The goal of technology integration is to use technology seamlessly so that the technology itself becomes a transparent and integral tool to teach core curriculum.

For ideas on models of professional development and how to begin to plan, see the sidebars "Professional development: 21st Century models" and "Steps to a professional development plan." For suggestions for ongoing strategies, see "20 tips for professional development." For an example of professional development services available for purchase, see "HP Education Services training and professional development." One effective method is to build an online community for educators to share and communicate. See "Building a learning community" for ideas on what to do.

Teaching with handheld devices

Imagine a grammar school class where a teacher can alter her lessons and measure her students' performance in real time—and ensure that 100% of her students are engaged, participating, and accountable. Sound impossible? It's happening right now. Elementary schools and high schools, with students equipped with HP iPAQs can now use remote, wireless technology to transform the classroom into a real-time learning environment.

Here's how it works. A teacher conducts a lesson about, let's say, the Civil War. At the close of that specific lesson, she can issue a pop quiz via her desktop, accessible from each student's iPAQ—AND—she can monitor each students response as they answer. The teacher can, via messaging, talk to a student during the test if it looks as though they are struggling, providing personalized attention without the public spotlight. The teacher can correlate all the students' responses, identify where gaps occur in the lesson, and re-teach that piece of the lesson right then and there.

She can also transfer student scores into a database which allows her to then analyze student groups to uncover any relationships like seat location in the classroom, morning vs. afternoon, etc.

Steps to a professional development plan

1. Develop a professional development subcommittee.
2. Demonstrate examples of classroom technology use.
3. Use multiple needs assessment instruments.
4. Design individual learning plans.
5. Identify leaders who can provide expertise.
6. Create a list of on-site learning opportunities.
7. Share a list of off-site and online learning opportunities.
8. Build in time for staff planning meetings.
9. Share successes as well as expectations not yet met.
10. Continue to plan and re-evaluate often.
11. Create programs that provide on-going support.

Professional development: 21st Century models

The key to effective professional development is finding a way for school systems to organize the work of qualified teachers so they can collaborate with their colleagues in developing strong learning communities that will sustain them as they become more accomplished teachers. What do successful professional development communities look like? And what role does technology play in supporting them?

Evolution of professional development

Face-to-face presentations, some of them including hands-on lab sessions, are still at the core of most professional development programs involving technology. However, in recent years these professional development offerings have evolved in key ways. For example, professional development used to be all about the 'how to' of technology, but the focus now is on instructional strategies and needs and academic goals.

Perhaps the biggest thing that has changed about technology-related professional development over the years is the recognition that it needs to be ongoing. In fact, federal No Child Left Behind funds earmarked for professional development come with a stipulation: they cannot be used for one-day or short-term learning experiences.

According to experts, another key element of sustained professional development is teacher collaboration and teamwork. Every teacher must be a part of a learning team—a team of teachers who meet often about practical ways to improve teaching and learning.

Online learning

Technology is perhaps the most important—and most underutilized—tool for providing teachers access to the targeted professional development they need, when and how they need it. Online courses, informal support groups, and other network-supported resources open the door to professional development opportunities far beyond what any school or district might be able to offer. In many school districts across the country, virtual course delivery systems are used for both online instruction and ongoing collaboration among teachers.

Models and mentors

Starting with the most energetic, enthusiastic, early adopters and allowing them to inspire others is a popular strategy today. Even in districts and states where no funding is available for model classrooms, many professional development programs rely heavily on identifying internal experts and leaders to serve as mentors to others.

In some cases, the mentors are students rather than adult teachers or administrators. Students make up 92% of the school population and have lots of energy and technology expertise.

Some believe the best professional development is that which happens casually as teachers share with teachers what they are learning on an ongoing basis.

Learning from case studies

Another collegial approach that focuses on mentorship and best practices is the type of "lesson study" used effectively for professional development in Japan. The lesson study process, popularized in this country by James W. Stigler and James Hiebert, involves extended observations of individual lessons by groups of educators who then meet to analyze the approaches and outcomes observed.

Lesson study and other sorts of best-practice observations benefit greatly from videotaping and viewing. Increasingly the video is digital and finding its way onto the World Wide Web.

From Technology & Learning
By Judy Salpeter

20 tips for professional development

1. **Be aware of your reluctant learners.** Be sensitive to each learner and listen carefully to his or her beliefs and needs. Try to refrain from judgment. Realize that change takes time and is different for everyone.
2. **Keep it real.** Develop all learning opportunities around projects, standards, and goals. Technology becomes more personal and real to teachers if they can see it in context and as part of their curriculum.
3. **Get your administrators on board.** Don't limit professional growth opportunities to the teachers in your schools. Successful programs have supportive administrators.
4. **Don't touch the mouse.** Explain the processes and act as a "guide on the side" when new or reluctant learners are trying out technology skills. Resist the temptation to step in and show them how to do it.
5. **Form study groups.** Follow up professional development sessions with small study groups that meet weekly, allowing participants to develop the shared language and common understanding necessary for acquiring new knowledge and skills. Larger study groups from different schools can hold monthly meetings, face-to-face—or virtually, focusing on shared interests or projects.
6. **Provide other opportunities for team work.** Teachers tend to be isolated in their classrooms, unaware of what is happening even in the classroom next door. Encourage teachers of the same grade level or subject area to develop curriculum collaboratively.
7. **Establish mentors.** Identify teachers, students, and curriculum specialists who can mentor faculty in their classrooms, during prep times, or after school, thus helping to model good technology-supported instruction and offering feedback and advice on a variety of topics.
8. **Support the mentors.** Provide each mentor with a coach who can observe, plan, model, and provide feedback on his or her projects and leadership skills, both on-site and online.
9. **Use technology to nurture the learning community.** A variety of online discussions, activities, and resources can be used to encourage ongoing conversation about issues raised during professional development sessions.
10. **Vary the tools for online professional development.** Asynchronous tools such as threaded discussions, e-mail forums, and Web archives are easy for most learners to use and offer the scheduling flexibility busy educators need for "anytime anywhere" learning. On the other hand, synchronous exchanges, including online chat, instant messaging, videoconferencing, and collaborative workspaces, work well for certain group assignments or virtual meetings such as debates, town hall events, and "meet the expert" interviews.
11. **Don't rush online learning.** Working entirely online is new and uncomfortable for most of us. Online communities will dissolve if there is nobody to facilitate them and to help build the feeling of community. Combine online learning and face-to-face meetings, especially at first, so that people can get to know one another and build a mutual set of goals.
12. **Market your professional development.** Teachers are so busy, they may not realize that what you are offering is exactly what they need. Create "FYI" memos that you send by e-mail, put flyers in their inboxes, create an electronic mailing list to promote upcoming events, and follow up with a phone call to confirm your coaching sessions.
13. **Say cheese.** Videotape all staff development activities for assessment and feedback. Videos can also be used as automatic portfolios. Individual frames can be captured digitally to use in teacher portfolios or on a Website.
14. **Show what's available.** Make sure teachers are aware of available and emerging technologies that could support them in the classroom or for personal productivity. Include "Technology Moments" at staff meetings where a device, a program, or a project can be demonstrated to the staff.
15. **Build a library of resources.** Develop a technology binder, Website, or video collection with sample lessons, support materials, tips, and practical ideas.
16. **Offer just-in-time tutorials.** So that your teachers can have what they need at their fingertips when they need it, create or use existing step-by-step, how-to tutorials in print, videotape, or online.
17. **Make yourself available.** Use e-mail and personal visits to check in with the educators you coach or mentor.
18. **Create summer learning experiences.** Provide summer institutes, when teachers have the time for hands-on experiences, and encourage sharing, playing, experimenting, and learning.
19. **Aim for the right ratios.** Coaching teachers works best if the ratio is 1-to-1 or, at the most, 3-to-1. The smaller the group, the easier it is for the mentor or coach to focus in on the learner's needs. Workshops work best if the ratio is no more than 15 learners per trainer, preferably under 12-to-1.
20. **Share what works.** Have teachers create electronic portfolios of work, ideas, and reflections to share in study groups. Help them show off their most successful projects and approaches. Put on a showcase and post it to a Website for everyone to see.

From Technology & Learning
By Judy Salpeter

HP Education Services and professional development

HP Education Services provides a professional development solution aimed at the needs of educational institutions implementing a technology initiative that can be customized to meet the needs of students, teachers, and administrative staff by providing training on the HP device, Windows operating system, Microsoft productivity applications, and classroom curriculum content.

HP technology training	On-site training provides all the information the staff needs to know to get up and running with technology. Training is based on your specific teacher and school needs and presents a range of topics such as hardware orientation, software applications, on-line curriculum, and classroom tools available on the laptops. The goal is to make sure educators can immediately start to integrate technology into their classrooms.
On-line student curriculum	There are two choices for classroom curriculum content and both provide the best offerings depending on grade level requirements. Choose either Connected Tech™ or Curriculum Pathways® to augment your existing standard curriculum. Connected Tech is a K-8 Web-based instructional program that teaches students technology skills within the context of the core curriculum. Curriculum Pathways® is a carefully integrated, easily adaptable product grounded in the principles of cognitive science.
On-line professional development for teachers	Connected University is an online professional development community that provides educators with courses, learning resources, just-in-time support and a convenient way to interact with peers nationwide as they work to integrate technology and improve student learning in their classroom.
HP Managed Classroom with Microsoft Class Server	The online learning management solution is specifically designed to help small schools meet the critical requirements of No Child Left Behind. The hosted and managed solution utilizes the framework of Microsoft® Class Server and SharePoint™ and provides schools powerful technology without the high costs and maintenance.

Building a learning community

Not all teachers are ready to collaborate online, but having time to plan, share, and learn from each other is essential for their own professional growth. If you are responsible for designing the school's professional development program, consider some of the following ideas for teacher collaboration:

- Encourage team teaching for interdisciplinary projects
- Create teams within departments, grade levels, or by area of interest that meet regularly
- Encourage visiting each other's classrooms
- Form reading groups where teachers read different articles and share their findings
- Find areas of expertise where experts teach the other members of the group their expertise
- Ask teachers to find a curriculum topic they would like to develop into a project together
- Provide support on-site and online for any project development

From TechLearning.com
By Barbara Bray

An inside look: Trussville City Schools

When Trussville City Schools in Alabama was created as its own four-school district, teachers and administrators began to dream anew about how technology could be used to help raise the quality of education. From that process came the decision to implement a one-to-one computer-to-student initiative. Step one was equipping 300 teachers with HP Compaq Notebook PCs.

Benefits

- New educational tools available to teachers
- Teachers gain flexibility with HP notebooks
- Increased opportunities to personalize education for students
- Greater freedom for teachers to work away from school and gain more control over their personal lives
- Improved collaboration with administrators and other teachers
- Better-informed parents, thanks to teacher Websites
- Teachers entered the world of wikis, blogs, and podcasts

On July 1, 2005, Trussville City Schools won the lotto. At least that's how it felt to the parents and educators who worked for years to disconnect the community's schools from the large district that serves metropolitan Birmingham.

With the birth of the four-school, 4,000-student district came the funding to enable teachers and administrators to dream anew about how technology could be used to help raise the quality of education. From that process came the decision to implement a one-to-one computer-to-student initiative.

The district's first step was to give 300 teachers a year to explore how best to use technology in their classrooms. Following that, a grade-by-grade introduction of PCs would be implemented. The district's technology choice for grades 6-12: HP Compaq Notebook PCs.

Once-a-week technology classes helped teachers learn about their new hardware and software. Now teachers are using the technology in many creative ways. Some examples:

- A physics teacher captures students' tennis swings on video and uses software that relates their swings to physics principles
- Teachers make frequent use of WebQuests, which challenges students to explore the Web for information
- Teachers use instant messaging to answer student questions after school
- Teachers develop social networking tools such as blogs, wikis, and podcasts
- Teachers invite students to do filmmaking with Windows® Movie Maker and share photos on SharePoint

Best of all, there is more flexibility for teachers. The HP notebook PCs' portability has helped teachers better schedule their days. They no longer are tied to the classroom until 6 p.m. They can leave at 3:30 p.m., take their notebooks home and connect to the district's Virtual Private Network. They can do anything they need to for class from the privacy of their homes.

HP's Digital Classroom Program

Notebooks and tablets—HP professional grade notebooks and Tablet PCs offer a balance of sophisticated technology and wireless mobility. HP's reliable, light-weight mobile products foster collaboration and provide anywhere access to Web-based resources and communication tools that help students develop 21st Century technology skills.

Thin clients—HP Thin Clients provide low-maintenance and affordable desktop solutions that are secure, safe, and durable because desktop controls and icons can be locked down, with no way to introduce viruses and no breakable moving parts. HP Thin Clients provide quick initial installation, software upgrades, and lower energy usage than PCs, which translates into additional cost savings. Networked learning centers, computer labs, and libraries can be equipped with more workstations at a lower cost and provide faculty with easy access to centralized information.

Mobile cart—HP's mobile cart solution provides schools and districts with a way to store, charge, and organize HP Notebooks and/or Tablet PCs in one place, creating a simple 1:1 computing environment and the flexibility to move from classroom to classroom.

Desktops—The HP Compaq Business Desktop Family provides worry-free computing and space-saving models that are ideal for an educational environment. Models are factory configured for usability, and offer the reliability and performance educators require for research and secure document storage.

Monitors—HP TFT monitors are perfectly suited for a classroom or meeting room audience, because of features such as height adjustment, tilt, and swivel options to create the most comfortable viewing experience. HP's variety of monitor options and sizes is sure to have an offering for your classroom, front office, or back office needs.

Printers—Schools and districts can count on HP LaserJet and HP DeskJet printers to be reliable, easy to manage, and affordable, for black and white and color printing.

Other digital classroom products:

Wireless projectors—Project powerful presentations to students in virtually any classroom setting with a wireless projector. Combined with HP's notebooks and tablets, teachers can move about the classroom to monitor student performance and create a truly collaborative classroom.

Interactive whiteboards—Combine an interactive whiteboard with a projector and computer to create an interactive classroom or office. With touch controls, teachers and students can write, erase, and perform mouse functions with finger, pen, or an eraser. Capture work as a screen shot, then edit or save notes directly into several software applications, including Windows or AutoCAD software.

Student response systems—Teachers have the ability to gather instant data from all of their students to quickly assess comprehension. This formative assessment enables the teacher to identify students' challenges and address them immediately.

Digital classroom accessories—mouse pads, computer security locks, projector wall mounts, wireless Bluetooth connections, whiteboard accessories, and more.

Software solutions:

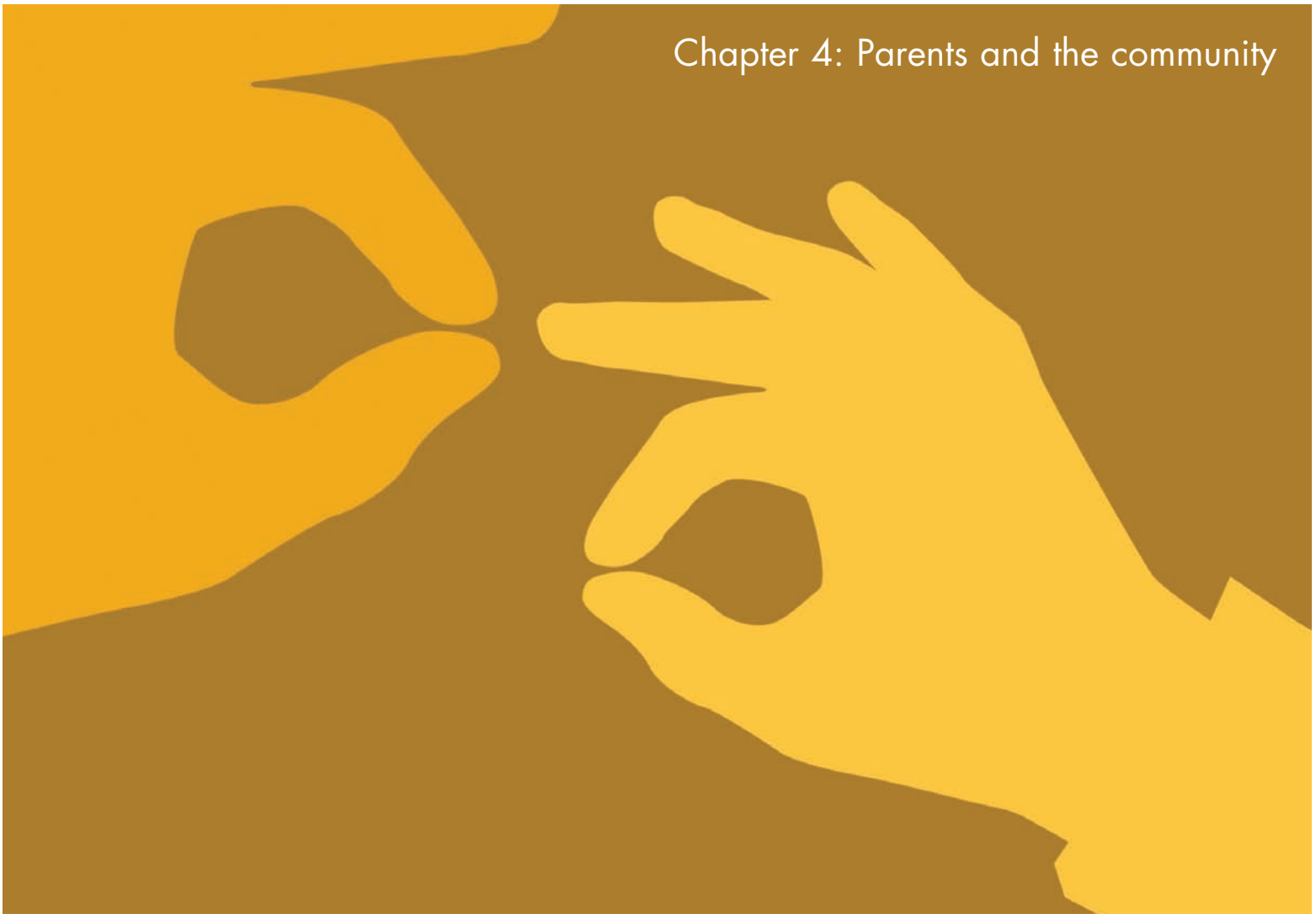
HP Learning Packs—With the direct purchase of any HP desktop, notebook, or Tablet PC, K-12 education customers can receive Learning Pack software at no additional cost. Each Learning Pack includes grade-level and subject-specific software in areas such as multimedia, arts, adventure activities, teacher tools, and trainings.

DyKnow - DyKnow Vision™ allows students to concentrate their note taking on solving problems, clarifying concepts, and making new connections. Later, they can play back their notebooks and see stroke-for-stroke how concepts were introduced. Teachers can use it to instantly transmit content to student computers for personalized annotation and use response tools to facilitate formative assessments. DyKnow Monitor™ helps teachers keep an eye on student screens, block internet browsing and other distracting applications, and blank screens.

Absolute® Software—Absolute Software's Computrace® is a guaranteed computer theft recovery, secure asset tracking, and data protection solution. Based in the BIOS* firmware of all HP notebooks and tablets, Computrace allows IT professionals to track stolen or missing computers, inventory computers district wide, and detect changes in hardware and software.

Information subject to change without notice.

Chapter 4: Parents and the community



Involving parents or guardians in students' education improves learning. That's just common sense, but it's also supported by the No Child Left Behind Act and noted in research. Yet in today's overly scheduled lives of parents, students, teachers, and administrators, making that home-school connection isn't easy. Technology helps parents to be involved by providing access to information, grades, teachers, and administration; enhancing communication with parents and the community, and calendaring.

According to the National PTA, studies confirm that parent/family involvement benefits both the children and adults involved. When parents are involved, their children's achievement, motivation, behavior, and attendance improve as well as their attitudes toward school, homework, and teachers. Parent involvement also helps school personnel to get to know students better and parents to relate to their children's lives at school.

Parents and communities are calling on schools to provide outreach and accountability. They want access to appropriate information for any student, teacher, administrator or parent, any time, from any location, through any device using a personalized Web portal. They also want schools to evaluate the progress of students through analysis of trends, test scores, and individual needs and provide ongoing access to student progress for parents.

NCLB requires schools to provide information to parents about their child's progress as well, and educators are paying attention. For example: in Michigan's Freedom to Learn (FTL) statewide one-to-one initiative, one of the goals is to empower parents and caregivers with the tools to become more involved in their children's education.

Inherent to the FTL solution are applications and tools that allow for consistent communications among parents or caregivers, students, and teachers. Parents can go into the district and school Websites to follow and monitor students' progress and get homework and assignments. This means that parents are intimately involved in the education of their students. Other states are using Websites to provide information too.

District Websites
The key to building a community is a robust Website or portal that creates the virtual center of the community online. With it, registered users can have access to the day-to-day information about the district. With access, the community can evaluate student, school, and district progress through test scores, AYP, state rankings, and more.

In building a portal, the idea is to know your constituencies, understand their needs, and communicate intelligently with them to keep them happy, informed, and supportive. Districts can use third-party software to provide services. Communities want to know that schools are preparing students to be part of a 21st Century workforce that will benefit the whole community. When they know exactly what is happening and are part of the process, they end up providing the funding, support for grants, and continued financial support to continue developing technology programs.

Third-party software solutions

Student Management Systems help K-12 educators and administrators gather, manage, analyze, and apply student data to enhance student achievement.

Content management systems enable schools to host their classes on the World Wide Web.

Applications software provides the basic tools of work—for word processing, databases, presentations, and spreadsheets.

Enterprise-wide solutions perform functions from basic financial and human resources management systems to more specialized applications like utility billing, public safety, and justice for cities and counties, as well as student management, financial aid, citizen service portals, and fundraising solutions.

Ten tips for starting a district Website

1. Establish a planning committee that reflects all stakeholders.
2. Review other school and district Websites to analyze what works well and what doesn't.
3. Identify the purpose of the Website and establish goals on what you want to achieve as a result of creating it.
4. Set policies, clear expectations, and procedures. You need a policy for the use of student names, photographs, and projects. Decide how you will protect the safety of students and staff and make information secure. Address legal issues such as copyright and fair use, student permission to publish, and acceptable use policies.
5. Determine who your audiences are (e.g., parents, students, staff, the community).
6. Decide what kinds of information you want to present to each.
7. Identify roles and responsibilities: Who will create, update, and add content, how often will they do so, and under what conditions? Who will have oversight over what is published and monitor quality?
8. Determine the method for creating the site. Programmers can write HTML code or others can rely on Web editing software or Web-based tools. Keep in mind that you want a template that's attractive, consistent, and easy for others, even students, to use.
9. Develop the structure for your site. Use careful organization and navigation. For example, plan a menu page carefully for quick access to everything and decide if you want to include interactive Web services for communication among school, home, and community.
10. Plan for change; Websites are always evolving.

From Technology & Learning
By Gwen Solomon

Accountability
Accountability means that districts take student achievement as their mission and are open about the results. NCLB mandates that schools and districts report test score results to parents and the community. States issue annual report cards on school performance and statewide progress. When results are easily available, they can have a real impact. Parents can be better informed about, and involved in, students' progress. Students can know where they stand at all times. Teachers can see when students need extra help.

The U.S. Department of Education says, "The more parents and taxpayers know about the academic achievement of their children and overall condition of schools, the more likely they are to be involved in the schools and the public school system. Under the law, parents get information about their children's progress in key subjects, the quality of their children's schools, and teacher qualifications. Teachers and principals get information about how each child is performing in order to diagnose and meet individual student needs. Policymakers and leaders at the state and local levels get information about which schools and school districts are succeeding and why, so they can export successful strategies to other schools and address any failures.

Coursework and grades
At the heart of accountability is streamlining instruction. One way to manage this process is to use course management software that creates an online environment for every class. On top of that, districts can build a system that allows parents access to all assignments with due-dates and project sheets. It is important to create access to public components of the student information system so teachers can post student scores and comments for parents to review. Parents can track their children's progress over time.

Communication
In order for school administrators to communicate with staff, teachers, parents, and the community, they need Web tools on the portal for such things as blogging, podcasting, and even social networking contained in a secure environment.

Calendaring
One part of linking home and school is in helping parents, children, and community members to keep track of activities that matter. Sharing information with busy parents about student activities used to be complicated. Now schools can organize all events, trips, performances, and anything else on their district's Website. Educators can post their schedules and the entire school's calendar is visible online. Then parents can view and print the schedules.

Punahou School Hawaii

Goals of Punahou School were to enable more direct communication between students, staff, faculty, parents, and alumni and to provide curriculum support through the use of technology.

The solution they created was a K-12 education portal to scale for 25,000+ people. It provides an integrated, collaborative solution for students, teachers, and parents. It contains comprehensive knowledge management and e-learning functionality. With it, teachers can prepare and share information with each other. Students can work on assignments at school or home.

They use HP products and services for Web servers, a connected storage area network, and IT infrastructure.

In order to support teaching, learning, and the school mission, they use both HP desktop and Tablet PCs, wireless access network, and servers for file and print. For student information and human resources applications, they use HP printers.

The result is that school resources are available to the community via the portal – enabling an even greater connection with the school and learning beyond the standard school hours. A wide range of learning options is available to students, helping them learn at their own levels and pace. Teachers receive a broad range of professional development training, which encourages them to support their curriculum through the use of technology.

Improving communications
The Anoka-Hennepin School District is the largest public school district in the state of Minnesota. When the school board charged the district to improve communications with parents by providing a variety of services and information online, the Anoka-Hennepin technology team began to evaluate solutions. The goals were to provide centralized, secure access to everything from bus route information to students' schedules and assignments, to attendance records and nutrition.

The challenges were to create a secure, online service to provide parents with access to a wide variety of student and school information; to use technology to be of greater service to the families of schoolchildren; to expand and improve communications in a way that reflects a lean operating environment; to develop a single login strategy, and to allow for multiple role management. The parents and community were involved, and the solution they found involved using HP consulting and integration services and its project management and implementation services as well.

Results
- They deployed a cost-effective secure online portal with enhanced security features that provides access to a wide variety of school and student information.
- It enabled parents and students to locate information that might otherwise require phone calls, paperwork, or personal contact.
- It enabled faculty and staff to access information from outside the school.
- It helped the school district do more with less, making vital information more accessible and customer-oriented, while maintaining the same level of staff.
- It provided accounts for more than 21,000 parents.
- It enabled teachers to post homework and other grade book information.
- It helped parents participate more fully in children's school experience, with information to support, guide, and keep students on track.
- Online accounts provided access with enhanced security features to authorized people.
- The convenient single, log-on strategy provided enhanced security features.

There are even more reasons for parents to be involved and informed. In today's online environments lurk dangers that entice students, and the problems happen more often at home than in the firewall-protected school network.

Net-wise teens: safety, ethics, and innovation keep parents informed

Acceptable use policies, filtering tools, and refining your network settings can help curb negative uses of the Internet at school, but what about when students go home? Certainly parents are concerned about their children having negative experiences on the Net, but because they aren't monitoring everything kids are doing online, or may be uncomfortable using technology themselves, risky or inappropriate behavior may go undetected. Making sure parents are educated about online realities and issues can help close this gap.

One of the best ways to open parent's eyes about the Internet, no matter what age their children are, is to take them Web surfing. Several schools run their own workshops with parents and show them sites popular with kids.

Encourage parents to talk frequently with their children about what they are doing online, and use kids' expertise to learn more about the Internet.

As do many educators, Caryn Gregg, technology coordinator at Prospect Sierra, sends the AUP home to parents to make them aware of the safety and ethical concerns surrounding the Net. "It serves to remind parents about the issues without preaching," she says. Next year, however, her school will go further by suggesting to parents that they "remove temptation" by taking Internet access out of the bedroom.

Parents might also be interested to know that putting the computer in a central location may have another positive side effect—getting girls more involved in technology. Educators and parents have observed anecdotally for some time that girls prefer computing in social settings, a fact supported by a recent report on girls and computers by the American Association of University Women.

From Technology & Learning
By Amy Poftak

Chapter 5: The digital district

Because today's students live in an on-demand, technology-dependent world, they learn differently and approach schoolwork differently than students did even a few years ago. This impacts learning, and some school districts are addressing students' need to get answers instantly, to communicate as they learn, and to create information and share it with others. How are they addressing these needs? By implementing technology programs.

With access to computers and the Internet, students are able to learn in an environment where information is readily available, where they can own their learning structures, and where they are so engaged that learning becomes meaningful. Reports from districts that have technology programs indicate higher attendance rates, increased engagement, and improved writing skills.

More and more districts are implementing 1:1 programs. According to a survey of 2,500 school systems in the U.S. that have 4,000 students or more, approximately 23% said they have 1:1 programs in at least one grade. Another finding was that 48% of chief technology officers in these districts said they were likely to purchase a computing device for each student by 2011.

From the America's Digital Schools 2006 report

Changing a school environment takes time, patience, and attention to detail. Schools that have been most successful have been especially attentive to upfront planning, inclusive of all stakeholders in decision-making, and employ powerful communications to all stakeholders before and during a long-term process of change. No one is an expert at this yet. Someday the integration of ubiquitous personal, portable technology will be the the norm. For ideas on how to create change, see "8 steps to 21st Century learning."

8 steps to 21st Century learning

Re-directing schools to adapt 21st Century learning means change is not easy. No matter how you look at it, change means rocking the boat. Along with the technology tools and skills that 21st Century learning demands, come shifts in the way teachers think and teach in the classroom. For many, this represents a huge departure from the chalkboards and lesson plans we have relied on for years. So if we know it is imperative to face the rocky waters and seriously commit to creating 21st Century learning environments in our schools, how can we make it easier?

- **Communicate.** Open and consistent communication is key when attempting to create large-scale change. The more your team feels involved in the process, the more they will buy in and the more smoothly things will operate.
- **Understand the change process.** Don't just go into the project without really knowing what to expect. The more educated you are about the change process, the fewer surprises you will have as you actually put new procedures in place.
- **Recognize barriers to change.** Again, educating yourself can be your biggest ally in this process. If you know the common barriers and responses to change, you will be more prepared to "coach" your team through the process. Arming yourself with information in advance will make your job easier in the long run.
- **Set goals.** Setting clear goals that are timely and measurable will help you navigate your course with ease. Goals help us organize our action and move forward to the results sought. Further, when everyone knows and agrees on the goals, the team can move forward with more direct focus.
- **Work as a team.** The whole is greater than…well you know the rest. Working as a team can make the difference between sinking and staying afloat. Effective teams communicate, trust, support, and inspire one another to the end goal. No matter where you are in this process, it's not too late to enhance your team-building efforts. Creating a cohesive team will be your greatest asset not only in building technology into your school, but in everything that you do together as a school community.
- **Create accountability.** Accountability helps people stay on target and not put their goals on the back burner. By constructing vehicles for accountability, you create clear expectations and a way that your team can support each other.
- **Evaluate.** Evaluation lets you know where you are compared to where you were and where you want to be. It also helps you know what's working and what could be improved. Evaluation is a sister to accountability because it also helps people stay on track and know how they are doing in the process.
- **Celebrate!** As we all know, technology doesn't stop evolving, so we never "graduate" to a fully technical environment. However, it is essential that you regularly look at how far you have come and celebrate. Remember that is it not just the destination, but the journey that makes you successful in evolving to a 21st Century learning environment. The more fun the journey, the less you end up rocking the boat! Jump in and enjoy the process.

From TechLearning.com
By Lydotta Taylor and Jill Fratto

The requirements and challenges facing districts are immense and the demands on leaders sometimes overwhelming. See "District mandates" below.

District mandates

- Manage costs in an era of shrinking budgets, increased enrollment, and growing class sizes
- Transform the learning experience by providing new learning models/solutions, increase access to information, help develop new learning/teaching platforms, meet student demands for new learning tools
- Ensure compliance by responding and adapting to major changes in education policy and government mandates with improved accountability and intelligent reporting tools
- Improve business processes by integrating and allowing secure access to a variety of student data, and using better solutions to manage administrative and supply-chain demands

The challenges

- Decreasing budgets and increased enrollments pressure campuses to do more with less
- The changing regulatory environment calls for more stringent accountability, tracking and reporting while security regulations require new spending in software and related services
- There is an increased demand on existing campus IT infrastructures as students and faculty become more demanding
- The Internet and e-Business revolution have trained students as customers of superior products and services, and now, students and staff want a highly personalized learning environment, offering the same speed and advanced technologies they have been given outside the campus setting
- Schools need the ability to analyze and adjust the supply and demand of resources, people, and processes—allowing them to take advantage of new opportunities and react to change

Leadership demands

- Respond to changing federal, state, and local government demands in real time with declining or limited budgets
- Empower administrators, teachers, parents, and students with immediate, customized content and data where and when needed
- Facilitate professional development
- Manage a ubiquitous but secure learning environment. Find better solutions to manage administrative (HR, finance) and supply chain needs
- Provide appropriate information access to students, the community and parents, and faculty—through a variety of access devices and with high levels of security
- Integrate information for more efficiency
- Lower IT costs and support needs
- Schools are also large employers and need efficiencies in HR, finance, purchasing, and other business practices to best use their limited budgets
- They are also often subject to strict government rules and regulations that require reporting student progress, and other vital data/reports to the government, and so have increasing requirements to track and manage this data

What does it take to change current school structures to 21st Century learning environments?

From back office to classroom

As districts develop their technology computing programs, they have to plan for the technological infrastructure needed to support the initiative. That infrastructure is the laptops or Tablet PCs, the software, the wired and wireless networks, the servers, and all the things that are needed in the data center.

How up to date is your district's infrastructure? How scalable? To find out, you should evaluate the existing networking capacity and expandability, the existing hardware capability, student and educator use of technology, professional development capacity and needs, and technical and instructional support services.

A major component in nearly all technology programs, after the laptop or Tablet PC, is the wireless network. The freedom and mobility of wireless networking is what gives students the opportunity to take their learning anywhere. HP provides districts with robust wireless networking options and helps districts implement scalable wireless networks.

Networks require additional software to run. Basic applications are those needed for the operation, maintenance, and manageability of the laptop as a device. Types of software include client management software, anti-virus software, firewalls, and filtering software. Other considerations include lifecycle management, data warehousing, and creating an educational portal. The district will also need to standardize the Productivity Applications (Office suite, reference tools, etc.), and the set of instructional applications.

District networks have to be made secure. There are multiple standards-based approaches to ensure network access security can be applied and co-exist. For example, security software can be embedded in BIOS of laptops and desktops for hardware security and asset tracking. The most secure method is to limit access to just those who require it and lock out all others. This type of security software in the BIOS can help track and recover stolen or lost equipment, which reduces the school's total cost of ownership for the program.

Just as technology changes, school district needs change as well. HP can bring a total management approach to implementing a school's technology program with implementation services like advanced planning, configuration, integration, staging, implementation, and project management throughout the years of ownership.

For some districts, the answer lies in thin client technology, a server-centric computing model in which the application software, data, and CPU power resides on a network server rather than on the client computer. Thin clients are affordable—with smart, low-maintenance solutions and easy access to centralized information.

Districts have found advantages with thin clients such as networked learning centers, computer labs, and libraries can be equipped with more workstations at a lower cost; workstations are secure, safe, durable, and student-proof because desktop controls and icons can be locked down. There is a quick initial installation and software upgrades, and lower energy usage means additional cost savings.

Lifecycle management is concerned with issues such as integrating new components into an existing installation, timelines for refreshing hardware, software and other peripherals, plans for asset recovery and retiring old, outdated equipment, and automating processes for upgrades, security patches, and other administrative tasks. Having a trusted, committed, and reliable partner like HP can make all the difference.

Before beginning a technology program, districts need to plan strategically for IT infrastructure changes, and this involves deciding on objectives for administrative use, learning and student achievement, and technology implementation. It means setting objectives and specific goals for the technology program. See the sample goals and objectives and the example of Michigan Freedom to Learn program on page 48.

Efficiency and infrastructure

HP ProLiant DL360 G3 Servers—ultra dense two processor servers – host Collier County Public School District's core administrative software. The district implemented Fiber Channel network links between the schools and the district offices and removed distributed servers from the schools and relocated them in a central data center using clustered servers. For more efficient support and comprehensive reporting purposes, all of the core administrative functions have been combined. By centralizing and consolidating the administrative functions across all of the schools, Collier County schools save many thousands of dollars.

According to Dr. Russell Clukey, Executive Director of Technology for the Collier County Public School District, "We have been able to centralize our business operations, simplify core functions, such as printing—by having networked devices readily available in each classroom—and initiate the transformation to a one-to-one student to PC ratio with regular refresh cycles."

Funding the Infrastructure

Getting the best return on investment in Collier County Schools means relying on HP. According to Clukey, "HP has helped us tackle the budgetary constraints from a number of angles. First, it delivers affordable and low maintenance products, which enables us to buy in greater volume, while keeping service costs to a minimum. It also has supported our attainment of "self maintainer" status—we have a repair team that has been trained and certified by HP—and we handle our own warranty repairs with HP paying us to perform this service. Finally, the HP Financial Services agreement saves us a huge amount of money and effort because as part of the contract, HP sets up new equipment.

"Collier County Public School District, and every student within it, has benefited enormously from the standardization on HP solutions at all layers of our infrastructure, delivering an integrated, simple to maintain environment in which all students have equal access to the latest technology."

Sample administrative objectives

- Improve administrative computing capacity and efficiency.
- Maximize total cost of ownership and technology value.
- Align instructional and operational use of technology.
- Take advantage of the latest technologies and best practices.

Sample learning objectives

- Integrate technology into curriculum.
- Improve student achievement.
- Improve student communication skills.
- Provide access to research, learning materials, and the tools to apply what they have learned.
- Improve student collaboration skills.
- Help students acquire critical-thinking skills.

Sample technology objectives

- Use a variety of technology tools in effective ways to increase productivity.
- Use communication tools to reach out to the world beyond the classroom and communicate ideas in powerful ways.
- Use technology effectively to access, evaluate, process, and synthesize information from a variety of sources.
- Use technology to identify and solve complex problems in real-world contexts.

Sample goals for a technology program

- Improve equity of access to technology.
- Improve the quality of learning.
- Institute and support best practice in technology integration.
- Improve student learning of content.
- Institute formative assessments.
- Employ differentiated instruction.
- Increase performance on standardized tests.
- Improve student ability to become lifelong learners.
- Prepare students for the world of work.
- Improve the home-school connection.

Objectives for Michigan's Freedom to Learn Program.

Goal 1: Enhance student learning and achievement in core academic subjects with an emphasis on developing the knowledge and skills requisite to the establishment of a 21st Century workforce.

Goal 2: Provide greater access to equal educational opportunities through ubiquitous access to technology.

Goal 3: Foster effective use of the wireless technology through systematic professional development for teachers, administrators, and staff.

Goal 4: Empower parents and caregivers with the tools to become more involved in their child's education.

Goal 5: Support innovative structural changes in schools and sharing of best practices through the creation of human networks among Program participants.

Equipment needs

Networking: HP's Adaptive Networks
HP's networking solutions, for example, provide a vision for the future in which networks are adaptive to users, applications, and an organization's needs. Adaptive networks are standards-based, convergence-ready, and able to easily integrate IP telephony, video, Web-based, collaborative, and future applications, which makes it important for teacher, parental, and support of technology implementation and communication. Features include:

- Open industry standards—no proprietary solutions
- Optimal security for wired and wireless networks
- Scalability and trouble-free growth at a reasonable cost
- Low maintenance
- Simplicity reduces the occurrence of errors
- Utilize existing employee know-how

Servers
The world's best run server infrastructures are built with HP ProLiant, HP BladeSystems, and Insight Control Management—software that makes your IT staff time-smart by providing total control, maximum flexibility, and tangible savings from your investment in HP infrastructure. These include:

- ProLiant Storage Server solutions that simplify storage management
- ProLiant server-based solutions for your Adaptive Enterprise
- Clustered solutions for high availability needs

Security
HP's security, backup, and business protection solutions help you:

- Back up your data and be ready to recover in the event of a problem
- Keep your data, networks, and systems safe from viruses, spyware, intruders, and other threats
- Keep your back office systems up and running, even in the most difficult times

For example, Rob Campbell, Network Supervisor of the Washoe County School District in Nevada, says, "HP Servers' dependability, coupled with the security of the hardened Microsoft Server operating system gives me great peace of mind, especially when contrasted with the headaches created by our legacy proxy cache servers. The biggest benefits from the HP appliances are their high-availability and reliability, security, affordability and flexibility—what more can you ask for?"

Data management
Accountability is an essential for improvement and change. In order for anyone—from a superintendent to classroom teacher—to be accountable, they need to have access to and understand data. Then they can make informed decisions about solutions. Data-driven decision-making gives teachers and administrators the information they need in determining what has worked in the past and how to do a better job in the future to benefit the students and increase achievement. According to the Consortium for School Networking (CoSN), 10 key reasons to use data in making decisions are to:

- Assess the current and future needs of students.
- Decide what to change.
- Determine if goals are being met.
- Engage in continuous school improvement.
- Identify root causes of problems.
- Align instruction to standards.
- Provide personalized instruction to students.
- Track professional development dollars.
- Meet accountability provisions of NCLB.
- Keep constituents informed about programs.

The first component that districts need for data management is an effective student information system. This makes it easier and more cost-effective to manage student records as well as give access to a wide variety of information sources and applications through a single browser window. Features that most districts find essential are:

- Ability to manage student records easily and cost-effectively
- Access to a wide variety of information sources and applications
- Built-in application and information security
- Flexible, scalable, secure mobility and wireless
- E-mail and messaging capacities
- Reduced IT complexity
- Better return on IT investment

The goals of using data to drive change should result in improvements such as enhanced learning experiences, more effective teaching and learning, improved student test scores, increased teacher productivity, use of formative assessments for individualizing instruction, improved communications with parents and the community, and access to information like homework assignments and student performance metrics.

Data-driven decision making, a step-by-step approach

STEP 1: Conduct an Information Inventory

Before considering solutions such as data warehouses or online analytical processing tools, examine your current information management systems. Data-driven decision-making is only as good as the data sources available. New systems cannot improve decision making if there are significant problems in the way data is being managed or in the existing student, financial, and human resources information systems.

STEP 2: Standardize data management

Once you've completed your information inventory, you'll need to implement any necessary changes and upgrades to your existing systems. Fix any problems identified in your current information system before adopting a more complex storage or analysis solution.

STEP 3: Analyze the data

You don't have to wait until you've collected all your data before you start analyzing it. Even if you don't have all of the information you'd like up front, you can still observe important trends that will lead to more informed decisions once all the information is available. The practical side of data analysis involves helping teachers and administrators learn how to interpret data and respond with the best resources and strategies for implementation.

STEP 4: Make changes and define new strategies

If you've identified relationships or gaps in your data, then the final and most important step is to take appropriate action. Whether the decision for change is big or small, the key is to make the most informed decision possible given the data you have available. In addition, never stop analyzing the data. Demographics change, personnel turns over, and school regulations update each month and year. Learn to look continually at the answers to old questions, include new information as it becomes available, and make new, more informed decisions. Once these decisions are made, the process of identifying relationships, determining causation, and implementing remedies begins again.

From Technology & Learning
By Todd McIntyre

Technical support

Investments in educational technology will only pay off if an adequate portion of the budget is devoted to professional development and technical support. Two distinct needs have to be filled and most of the time, it involves having two different staffs to address the issues. It's important to have a technician available to assist teachers with hardware and software difficulties, but it's equally important for teachers to have access to a support person who can provide assistance in developing and implementing technology-integrated lessons, including techniques for managing technology with groups of students. In many districts, the needs are so great that a solution is to outsource some of these services. For example, HP Education Services help districts implement a successful program that results in faculty support and buy-in.

Paying for technical support

Districts have to find ways to fund technical support services. Here are several approaches taken by districts across the nation:

- **Technical support surcharges.** Whenever a site or office makes a technology purchase, the district adds a surcharge to cover ongoing costs for infrastructure and instructional technical support.
- **Annual technical support fees.** Instead of a surcharge at purchase, sites and offices are assessed a fee per computer each year. Fees are used to pay salaries for infrastructure and instructional technical support staff.
- **Site-based technical support.** The district takes care of the network, but schools are responsible for hiring and paying for their on-site, day-to-day support. This often takes the form of stipends for existing employees.
- **Interns provide technical assistance.** Districts form partnerships with community colleges and technical schools to provide student internship opportunities. Interns, who work under the supervision of paid district staff, can handle trouble-shooting, maintenance, and repairs, freeing district staff to offer more instructional technical support.
- **Student-provided technical support.** Programs such as Generation YES (http://genyes.com) and Mouse (http://www.mouse.org) train students to provide services. Advocates see this as a win-win proposal. Students gain marketable skills, and district staff can provide more instructional technical support.

From Techlearning.com

Funding strategies

Effective change doesn't come cheap. Districts have both limited resources and stringent requirements, so strategies must be cost-effective. They have to be more creative than in the past to keep their current initiatives going and add new strategies for the future. How can districts decide what to do? And how will those whose mission it is to integrate technology preserve needed funds?

According to the Consortium for School Networking, schools and districts whose leaders have a vision for technology use, plus strong support from the community and parents, are more likely to sustain or even expand technology initiatives—more so than schools and districts that lack this visionary leadership and support. Yes, funding remains an issue; however, these leaders tackle the problem by finding ways to raise additional funds or to re-purpose existing dollars.

Whether proposing a new bond issue for technology, trying to win a grant, or just getting community support, it is important to know what you want.

Where do you start? Form a team to:

- Define the purpose.
- Write a mission statement.
- Define the scope of work with goals and objectives.
- Develop a budget and timeline.
- Find a funding source that aligns to project.
- Identify technology program stakeholders.

Financing options from HP Financial Services make the most advanced technology more affordable and accessible, while at the same time offering you access to a comprehensive refresh and upgrade program. HP can provide your students, teachers, and administrators with a foundation for success, without breaking your budget.

For example you can choose from three lease alternatives that are designed to work with your budget and give you the end-of-lease flexibility you need:

- Tax-exempt installment sale—a cost-effective path to long-term ownership
- Tech refresh lease—with built-in ability to upgrade easily
- Fair market value/true lease—low payments with flexible end-of-term options

Stay ahead of the Curve

With technology constantly changing, districts don't want to be locked into owning out-of-date assets.

EduFlex™

With EduFlex financing options from HP Financial Services, you get:

- One-stop shopping with HP—one complete source for all your technology and financing needs.
- A world-class company that understands your needs and can provide support over the life of the solution.
- An affordable alternative to potentially costly and time-consuming voter referendums.
- 100% financing including non-HP equipment, services, installation, and more, so you can conserve operating capital and get more of what you need.
- No strings, no hassles.
- Easy upgrades during and after the lease term to help you avoid technology obsolescence.
- Safe and easy equipment disposal—no more surplus property bids.

Kershaw County School District

HP Financial Services worked out a lease agreement so Kershaw County School District (KCSD) could get state-of-the-art equipment—laptops, servers, networking, etc.—every year. KCSD also selected a four-year warranty option on all devices to eliminate the need to budget for repairs. Dr. Agnes Slayman, Assistant Superintendent for Curriculum and Instruction, noted, "By leasing the equipment, our budget became predictable and manageable. And, because the equipment is on a four-year lease, we're able to avoid the obsolescence issues that plagued us in the past."

While leasing provides the flexibility districts need to keep up with fast-changing technology, HP goes one step further with an innovative tech refresh lease option, which allows you to upgrade quickly and easily according to your own specific needs. Plus, when you lease through HP Financial Services, there is no need to worry about potentially costly disposal issues. Simply return the leased equipment to HP at the end of your lease term — hassle free. In addition, if the leased equipment is destroyed, damaged, lost, or stolen, a service team will take responsibility for getting the equipment up and running quickly.

Total cost of ownership

Understanding the full range of costs associated with technology assists school leaders in budgeting for the future. In order to plan for technology and change, districts should evaluate the Total Cost of Ownership, factoring in direct costs such as support, training, and management; indirect costs like downtime; and hidden costs incurred when teachers, staff, and office personnel must manage and support the equipment on their own. Only by evaluating all of the components of technology programs can a district determine the real costs. The Consortium for School Networking offers a free, online tool to determine Total Cost of Ownership for technology. You can access the tool, along with background information and case studies at http://classroomtco.cosn.org/gartner_intro.html.

Standardizing on equipment

To standardize and update the district's technology, the Hillsborough County School District needed to evaluate equipment purchases on the basis of the total cost of ownership. At the same time, it was their vision to gain a greater return from what they were purchasing and committing to, not just on the dollar volume, but value from a relationship with one vendor and the value-add that it can bring.

According to Jack Davis, the district's Chief Information and Technology Officer, "Under our partnership with HP, the standardization of devices throughout the School District has meant our teachers can remain focused on educating students, and our IT staff has been able to train quickly and comprehensively, making it highly successful at maintaining the availability of the technology. In turn, the simplified support environment saves us money, and we are particularly enjoying the ability to engage the local community in our technology program at a more affordable level. To ensure the success of the relationship, HP actively participates in our planning and professional development, helping us with new ideas and fresh ways to look at things."

Top 10 returns on investment

With budgets slashed, NCLB-inspired demands for quick spikes in student achievement, and the public clamoring for proof that technology is really working in education, all eyes are on the bottom line. *Technology & Learning* polled its advisors, writers, and other ed tech experts for their take on investments yielding the best returns for schools. Here are their answers:

- **Timely and sustained teacher support.** All the technology and curriculum resources in the world will have no impact on student achievement without the guidance and tech support educators need to make it useful on a daily basis.
- **High-speed Internet access.** The digital divide is no longer just about access, but about quality of experience on the Internet.
- **Risk assessment.** Can your district afford a lawsuit?
- **Microphones for teachers.** Research shows that students in amplified classrooms are making significant gains in achievement.
- **Video-on-demand.** Fingertip access to movies offers a powerful and immediate way to reach today's media-immersed generation.
- **Wireless environments.** A new wireless networking standard is making it easier—and safer—than ever before for districts and schools to provide their users with anytime, anywhere access.
- **Digital projectors.** Paired with compelling content, digital projectors have the potential to transform classroom environments into 21st Century learning hubs.
- **Data management tools.** In addition to helping districts deal with NCLB, data management systems can provide schools with the ultimate return on investment: improved student achievement.
- **Portable storage.** Gone are the days when applications used to support teaching and learning can fit on a 1.44MB floppy disk. Putting a flash memory drive in every student's hand solves schools' data storage and mobility issues in a pint-sized package.
- **Online subscriptions.** Cost-effective, timely, space-efficient, and quick—online references and databases have become a staple of the digital classroom.

Getting efficiency and value

Eau Claire School District
The Eau Claire Area School District encompasses 13 elementary schools, three middle schools, and two high schools serving some 10,800 students. The district works to integrate technology into daily life in the schools to enhance learning, student achievement, communication, productivity, and creativity. Funding is always a concern. Per capita income is below the state average. Yet when the schools need funds, the community most often finds a way to step up.

That's what happened several years ago, when the district presented a referendum for voter approval to support a five-year IT spending program. Knowing the value of every dollar, the district used Western States Contracting Alliance pricing and decided to standardize on a single vendor for classroom technology to maximize value.

The district's objective was to get maximum value for taxpayer dollars spent on classroom IT for public education. Primary goal is to maximize student achievement and prepare students for the next levels of education. Through standardization on HP products and streamlined purchasing using the WSCA agreement, Eau Claire Area Schools gets the most for every dollar spent on IT in the classroom.

Washoe County School District
Annually educating in excess of 62,000 students, Washoe County School District is Nevada's second largest district. Covering the Reno/Sparks metropolitan area, Incline Village, Gerlach, Empire and Wadsworth, its facilities include 63 elementary schools, a special education school, 15 middle schools, 12 comprehensive high schools plus a magnet high school on the community college campus and Regional Technical Institute.

With each school linked back to the district office with a T1 line, the district relied on a legacy solution for a patchwork of proxy/cache services. When funds became available, the School district would add or replace equipment, but it was continually impacted by the shortcomings of this expensive, poorly integrated, and operationally challenging approach.

Challenges
- Provide firewall, VPN, and caching services to over 100 sites.
- Remove dependencies of administration applications on unreliable proxy cache servers.
- Improve throughput of Internet traffic.
- Simplify support operations relating to firewall, VPN, and cache tasks.

Solution
- Implementation of 40 HP ProLiant DL320 Firewall/VPN/Cache Servers running hardened Microsoft® Internet Security and Acceleration Server 2004.

Results
Simplicity:
- Bundled solutions package facilitated straightforward 'plug and play'—style installation.
- Increased standardization on HP solutions has allowed further leverage of support efficiencies, existing processes, relationships, and expertise.

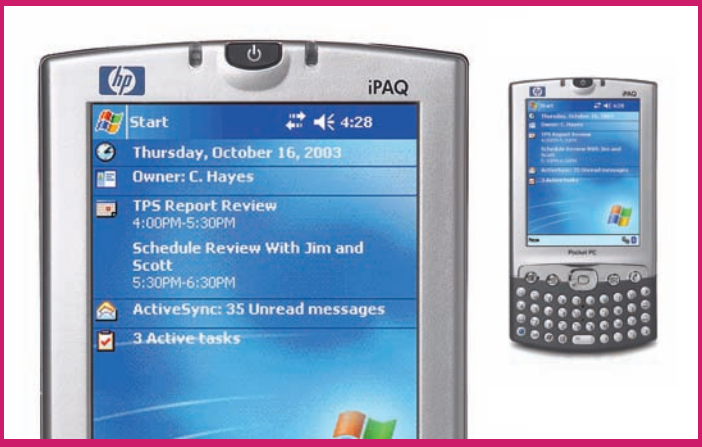
Agility:
- Management and configuration activities can be performed remotely from a central location—diminishing requirements for field-based problem resolution.
- Third-party extensions for anti-virus, content filtering, and other functions can be added to complement the already rich feature-set present in the server whenever required.

Value:
- Each appliance costs roughly 50 percent of a replaced legacy server, effectively doubling the number of schools that can be implemented for the same investment.
- Resilient solution has cost-effectively increased application availability, removed burden of problem resolution associated with maintaining legacy cache servers, and improved levels of protection against Web-based threats.
- End-user observations of enhanced Internet traffic throughput achieved without adding expensive bandwidth or switching/routing equipment.

In addition, districts have to balance their administrative needs with the needs of students, teachers, parents, and the community. Using technology to keep open lines of communication is important for providing information and gaining the support of all stakeholders.

When they get the support of a technology partner like HP, it all works seamlessly. Dr. Agnes Slayman, Kershaw County School District's Assistant Superintendent for Curriculum and Instructions, says, "Thanks to HP's understanding of what it takes to be successful in education, our 1:1 program has had a fabulous start. Technology is driving students to want to learn more. Children who were previously disinterested in school are now active participants in the classroom. It has transformed the way our faculty teaches—it is more creative, and assignments are more rigorous and more relevant to what a student will encounter in life. Kids have moved from being passive receivers of information to being actively engaged in projects. Students who leave Kershaw County School District are going to be able to compete with anyone worldwide to be successful in post-secondary education and the workplace."

HP's district solutions



Notebooks and tablets—HP professional grade notebooks and Tablet PCs offer a balance of sophisticated technology and wireless mobility. HP's reliable, light-weight mobile products foster collaboration and provide anywhere access to Web-based resources and communication tools that help teachers help students to develop 21st Century skills and help district administrators keep track of everything that goes on.

Handhelds—HP's iPAQ Pocket PC puts the power of a desktop PC in a sleek, stylish, and compact to-go box that gives students and educators access to Microsoft Pocket applications like Internet Explorer, Outlook, Word, and Excel. This handheld lets you create big ideas but it fits comfortably in your hand, bag, or backpack. Management by walking around is possible when you carry your office files with you at all times.

Desktops—The HP Compaq Business Desktop Family provides worry-free computing and space-saving models that are ideal for an educational or office environment. Models are factory configured for usability, and offer the reliability and performance administrators require for data management and secure document storage.

Thin clients—HP's Thin Clients provide low-maintenance and affordable desktop solutions that are secure, safe, and durable because desktop controls and icons can be locked down, with no way to introduce viruses and no breakable moving parts. HP Thin clients provide quick initial installation, software upgrades, and lower energy usage than PCs, which translates into additional cost savings. Networked learning centers, computer labs, and libraries can be equipped with more workstations at a lower cost and provide faculty with easy access to centralized information.

School districts with thin-client implementations have found that students who have access to a digital learning environment are more stimulated, more motivated, and perform better academically. Thin Clients make learning and teaching enjoyable and affordable with smart, low-maintenance solutions to get students up to speed on their computer skills, help teachers deliver their curricula in exciting new ways, and provide staff with easy access to centralized information.

Other district solutions:

Monitors - HP TFT monitors are perfectly suited for a classroom, office, or meeting room audience, because of features such as height adjustment and tilt and swivel options to create the most comfortable viewing experience. HP's variety of monitor options and sizes is sure to have an offering for classroom, administrative, or back office needs.

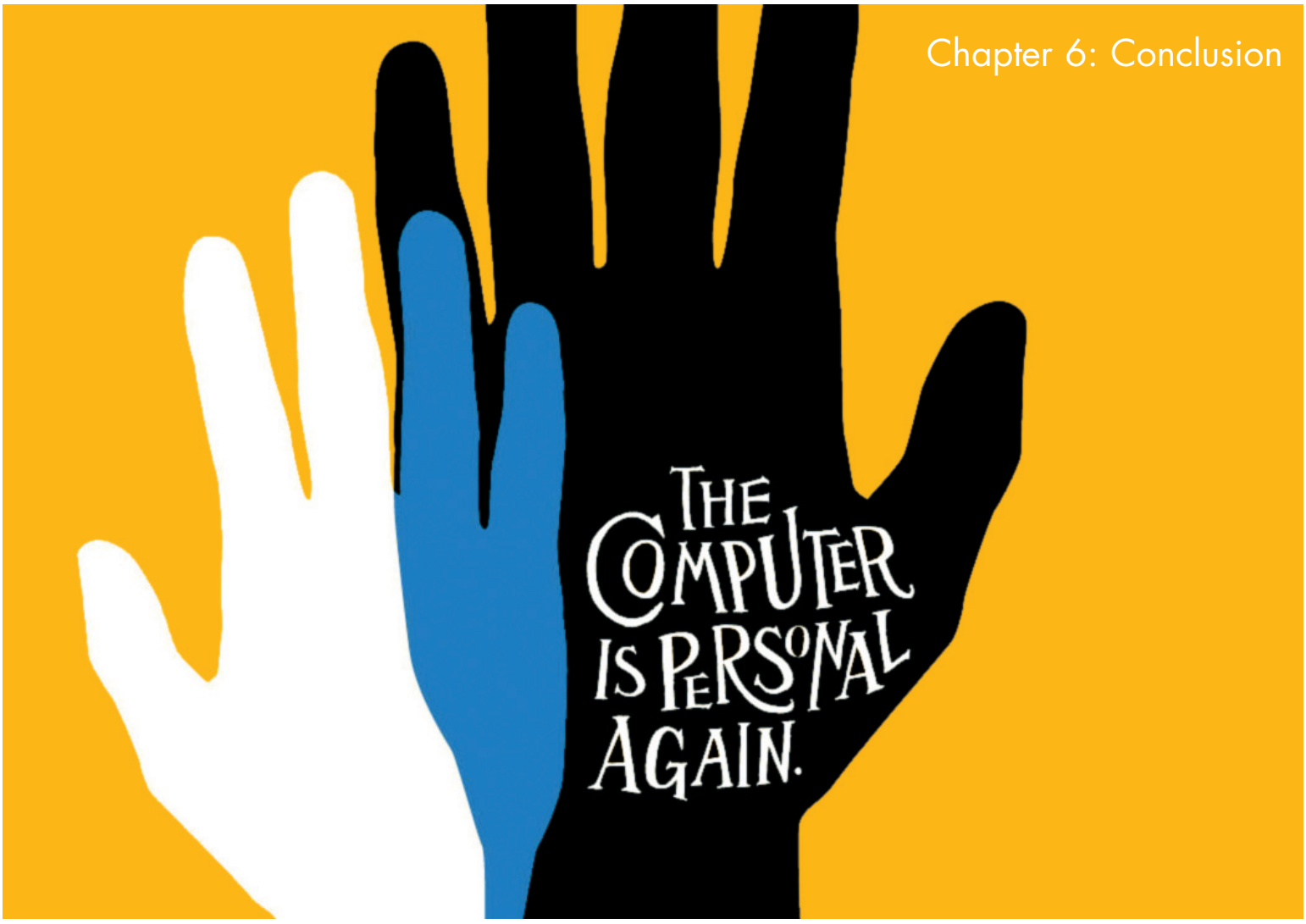
Printers—Schools and districts can count on HP LaserJet and HP DeskJet printers to be reliable, easy to manage, and affordable for black and white and color printing. These printers contribute to a low cost of technology ownership and provide great return on investments.

Servers
Best known for reliability, HP ProLiant servers are designed to offer value-added functionality for maximum performance and flexibility.

Wireless networking and wireless solutions
Switches, hubs, and wireless access points let you connect student, teacher, and district access devices to your network with no cabling hassle. Networking products build reliable networks that are always on and always working, creating trusted environments for learning, assessment, and district management.

Storage
HP StorageWorks offers a comprehensive portfolio of products to protect your data reliably, simply, and easily. Because when it comes to data protection, a school district needs dependable backup.

Information subject to change without notice.



Creating the most effective learning environments, providing new content and tools that matter for students in the future, and addressing the needs of students, teachers, parents, the community, and administrators are challenges facing every school district today.

Combine that with a rapidly shifting world in which students' experiences are radically different from those of our own at their age, and we see that our work is cut out for us.

If we accept that new skills are needed for students, then adults in an educational system must acquire them as well. Thomas Friedman says that schools should teach greater collaboration and synthesizing skills, create a community of learning, cultivate the entrepreneurial spirit, and help everyone learn how to learn. Creating learning communities paves the way for adults as well as youngsters to acquire these skills.

In addition to the skills are the tools that have become essentials. If a district is going to reach all learners, prepare them to be part of a global workforce, and be ready for the future, the students, teachers, parents, and administrators need access to the tools. For reasons of equity alone, schools have to plan and prepare for creating a technology-rich environment.

Planning is essential. How a district acquires technology is less important than having the decisions supported at all levels. Making it all happen takes leadership. An effective leader is someone who commands respect, takes ownership and responsibility, has expertise and experience, and who can provide guidance and direction and inspire others to change. Someone who is going to lead a 21st Century technology program would need additional skills such as:

- Has a clear and strong belief system that is clearly articulated
- Has a knowledge base on digital learning environments and its relationship to curriculum and instruction
- Keeps teachers and principals informed on the latest technology program results, literature, and research
- Challenges the status quo and takes responsibility for achieving results
- Has a positive attitude and inspires teachers and principals to believe they can accomplish the goals
- Creates the environment for success: Establishes lines of communication; a system for input that includes teachers and principals in the decision making process; a system of procedures to ensure that problems are solved in an efficient manner
- Knows when to push folks forward and knows when to pull back
- Isn't afraid to make decisions and make them happen

Educational communities need effective leaders at all levels. In addition to the new skills people will need for the future, the old skills of effective leadership are essential to change. See "Eight leadership tips" for leadership tips and "Four technology leadership tips" for a few more technology-oriented things for leaders to think about.

Eight leadership tips

1. **Communicate**
   Make sure the community has clearly defined goals and that those goals align with the overall vision, goals and objectives of the grade, school, district, etc.

2. **Inspire action**
   Help people set clear goals and understand the benefits that will result. Support them to reach those goals, accept errors, and show how to learn from mistakes.

3. **Release potential**
   Any organization contains an incredible amount of human talent. It is leadership's challenge to unlock this human potential and engage people's brains rather than stifling their attempts at being creative in how they go about their work.

4. **Reward a good job**
   Help community members to feel good about their jobs and be supportive of their work.

5. **Be observant**
   Watch carefully and listen between the lines to get a good sense of what is happening.

6. **Support needs**
   Provide what the community needs when possible and provide explanations when it is not.

7. **Trust**
   Create a team spirit to unleash creativity. Trust people and they will trust you.

8. **Create understanding**
   In any change program, it is important that everyone involved knows and understands the reasons behind the change.

From TechLearning.com
By Vasilios Fevgas

Four technology leadership tips

1. Questions to ask yourself
In developing your vision for using new technologies, ask yourself: What would a school look like and how would educators manage teaching and learning in a rapidly changing world? How can our professional support activities leverage these qualities? What would a classroom look like that leverages these qualities, creating first-time-ever learning experiences for our students?

2. Involve the community
Involve all stakeholders in the development of any education technology plan, not just the teachers and administrators but also the students, parents, members of the school community, and business leaders—because it is their plan.

3. Technology as culture
Make technology an integral part of the culture of the school. In order to operate in the school as a teacher, support staff, administrator, or student, you must use technology. It must become part of the identity of being a member of the school. The new tools will alter the culture of the school, and in telling our stories we will infect the community with a new vision.

4. Leverage student skills
Take advantage of students' knowledge, especially in terms of being able to use technology. There are schools that give credit to kids for running the network or helping teachers learn how to use technology tools. The collateral skills they pick up in terms of responsibility and teamwork are wonderful.

From Technology & Learning
By Jason Ohler and David Warlick

"America's Digital Schools 2006," a national survey of the top 2,500 U.S. school districts predicts that more than half of all student computing devices will be mobile by the year 2011 and online learning will grow at a compound annual rate of 26% over the next five years. The districts also report rapid growth in 1:1 computing, whereby each student and teacher has one Internet-connected wireless computing device for use both in the classroom and at home. The good news: 87% of schools offering 1:1 computing report substantial academic improvement where results were tracked.

Key findings
- Digital schools are transitioning from a desktop world to a mobile world
- Ubiquitous computing is growing rapidly
- Ubiquitous computing practitioners report substantial academic improvement
- A bandwidth crisis is looming
- Online learning is growing
- Professional development is key
- Low total cost of ownership is increasingly important

There is no doubt that the future of education is going to be interesting. Whether districts are prepared to address the issues and needs is another. The key is to set in motion ongoing planning and to find a trusted technology partner with both reliable products and extensive services. HP has a dedicated education team to help customize solutions to help districts create their digital learning environments. HP's range of products, services, and partners is the one stop for education technology.

"HP is fully committed to education and to becoming a trusted technology partner with reliable products," says Joel Coombs, HP's Director of Education.

The HP Way
- Reliable technology and personalized programs to address your unique needs
- Easy-to-use, on-time solutions that provide educators with the tools needed to be successful
- Comprehensives services and dedicated support to partner with you through implementation and beyond
- Broad and deep product lines for all your needs, from a company with a history of quality

Resources

Pew Internet and American Life Project Reports on the Internet Evolution
http://www.pewinternet.org/topics.asp?c=3

Pew Internet and American Life Project Reports on Technology & Media Use
http://www.pewinternet.org/PPF/c/4/topics.asp

Pew Internet and American Life Project Reports on Education
http://www.pewinternet.org/PPF/c/10/topics.asp

The Partnership for 21st Century Skills Publications
http://www.21stcenturyskills.org

Networked for Learning: Enabling 21st Century Student Success
http://www.techlearning.com/specialadvertising/NetworkedForLearning.php

The Horizon Report
http://www.educause.edu/LibraryDetailPage/666?ID=CSD3737

Total Cost of Ownership Project
http://classroomtco.cosn.org/gartner_intro.html

Technology & Learning and TechLearning.com
http://www.techlearning.com

Hewlett-Packard
http://www.hp.com

Consortium for School Networking
http://www.cosn.org

One-to-One Institute
http://www.one-to-oneinstitute.org

Michigan Freedom to Learn
http://www.ftlwireless.org

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