The K-12 Blueprint for e-Learning Initiatives

A resource for education leaders interested in implementing anytime, anywhere, anyway technology-supported learning in K-12 education.

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n. anytime-anywhere-learning—an innovative approach to education dedicated to granting children access to the tools they need to unlock unlimited opportunities to learn anytime and anywhere.

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INTRODUCTION

No two students are alike. Each and every child deserves learning opportunities tailored for his or her unique needs, abilities, and interests. Impossible? Not with smart, adaptable curriculum powered by today’s educational technology.

Technology has a crucial role to play in preparing young people for success in the 21st century. But this success requires more than simply placing the right tools in students’ hands. To help promote success, Intel provides this comprehensive blueprint for building ambitious and effective technology initiatives, based on real-world successes, that takes into account the complex array of variables that impact schools today. This blueprint outlines a way to transform American education, not by altering what we do but how we do it, through:

Policy. Federal, state, and local policy provides the context in which all education takes place. Whether responding to government-mandated testing and accountability requirements, participating in state-level initiatives designed to address issues of concern, or working with your local community to build acceptable use policies that encourage learning, understanding the elements of effective policy-making is crucial to today’s education leaders.

Leadership. Strong and insightful leadership—at a building, district, or higher level—is one of the key elements in implementing an initiative that yields results. Having a strong vision for how technology can transform teaching and learning, knowing how to build effective teams and solicit buy-in from stakeholders, and an ability to communicate effectively using 21st century tools are all vital elements of effective leadership.

Funding. Funding to implement visionary programs is foremost on the list of concerns for many education leaders today. Funding poses a crucial challenge, requiring the identification of sources of initial funding, having an intimate understanding of TCO (total cost of ownership) and VOI (value of investment), and tapping into the

TECHNOLOGY HAS A CRUCIAL ROLE TO PLAY IN PREPARING YOUNG PEOPLE FOR SUCCESS IN THE 21ST CENTURY.
efficiencies and cost-savings made possible by technology implementation.

**Infrastructure.** An effective education technology initiative should start with the needs a technology is meant to address, not mere technology for technology’s sake. The success of a technology-based program requires wise decisions about the hardware and software to be employed, as well as build the IT infrastructure to support reliability and ease of use.

**Professional Development.** Ongoing professional development and support for teachers and other staff members is one of the most crucial and frequently overlooked elements of an effective technology initiative. Offering a variety of options (ranging from just-in-time training to on-the-job mentoring) and using data to shape your decisions is crucial to a successful professional development program.

**Results.** Results lie at the heart of any initiative. Specifying a program’s goals from the start, determining how progress will be measured, monitoring results over the lifetime of the initiative, and reshaping your program based on what you have learned along the way are all central elements in building an effective technology-empowered initiative.

Through the clear steps outlined in this blueprint, educators can dramatically improve the efficiency of our schools and give students the tools they need to succeed in education and build prosperous futures for themselves and society.
Whether students are college-bound or preparing for life in the modern workplace, they need versatile technology skills. *The flexibility and immediacy of laptops make them practically indispensable in today’s colleges and universities, while computer literacy is becoming an essential prerequisite for most 21st century jobs.*

Learners outfitted with laptops are better equipped for today’s classrooms and tomorrow’s workplace. They are ready to take advantage of the digital learning opportunities that increasingly define modern education. And sound policies will help set the stage for the next generation, eager to make the most of what technology has to offer.

Policy is where the rubber hits the road. And sweeping, ambitious policy grounded in real-world practicality can help us get closer to achieving true anytime-anywhere-learning, where students, teachers, and administrators can reap the full potential of education technology. Where students are equipped with the right tools today, for the skills they will need tomorrow.

Classroom teachers as well as building and district-level leaders are vital to the success of any education initiative. Also key is an understanding of the
broader context that drives and shapes such initiatives. Effective federal, state, and local policy provides the foundation that enables classroom innovation to flourish.

Key aspects of effective policy are flexibility, frequent evaluation, and the ability to modify policy as needed to engender true transformation. A systematic approach to policy formulation enables policy makers to establish realistic policies in reasonable time frames. Central to the process is a focus on clear goals and the evaluation elements that allow the process to be checked continually to determine whether the intended audience is truly benefiting. As part of this process, policy makers must be keenly aware of the fairness and equity of the policy to all parties it impacts.

Participation in public education policy-setting by educators and community members is on the rise at the federal, state, and local levels. According to the Virginia Commonwealth Educational Policy Institute’s (CEPI) Public Participation in Education Policy: Changing Roles, “The role of public participation in educational policy has evolved over time in the framework of the federal/state/local control over education. Although in the past public participation in educational policy was quite limited and for the most part consisted of citizens contacting federal and state legislators to voice their opinions, the role of public participation has increased with the advent of Open Government laws (a s well as the Freedom of Information Act) and the increased access to information provided by technology. It is easier today than ever before to stay informed about the issues facing education, to interact with the educators and the policy makers at all levels and to participate in the process through various mediums.”

While the world of education policy is often a confounding one, the process begins with a simple assessment of your education technology situation and needs. Some questions to consider when thinking of your school’s education technology policies, include:

- Does every student have access to modern computer technology while at school?
- Is every student’s home connected with either universal broadband access or, preferably, wireless?
- Is a computing device, ideally a laptop, available for every teacher?
- Does your statewide curricula emphasize critical policy needs and higher-order thinking skills rather than factual recall and low-level procedural knowledge?
- Are professional development initiatives in place that could help educators implement such curricula?
- Are online coursework options available for students?
• Do statewide assessments assess higher-order thinking skills rather than fact memorization?

• Do you have permission to use low-cost or no-cost electronic textbooks and other online learning materials instead of paper texts?

• Would you like greater flexibility to repurpose existing funding streams for your school?

• Do the educators in your district and the surrounding community understand the needs and issues pertaining to 21st century teaching and learning, workforce development, and a globalized economy?

**Get Involved**

According to the CEPI report, “Perhaps the greatest area of influence on educational policy comes from those who participate in the legislative process. Which programs receive federal funding or federal scrutiny in local and state practice is motivated in large part by public participation in the legislative process. The effort of focused educational lobbying has resulted in greater funding for specific programs as well as mandates for services without complete funding. This takes place in the form of both professional lobbying and also individuals testifying and participating in hearings on educational issues.”

Ways for schools and districts to become involved include:

• Public opinion surveys and polling (Surveys are an effective way to discover support strategies for your initiative.)

• Direct mail and media announcements

• Partnering with community organizations to support policies that benefit both school and community

• Working closely with local press

• Developing fund-raising plans

• Creating community committees for input and guidance

• Forming a political action committee

• Inviting VIPs to your schools to show them what is going well and where help is needed

• Having visitors talk with students, who can tell your story in ways that administrators might never think of

• Recruiting students for decision-making positions (A number of states have enacted legislation providing for student members on the local school board to give the student voice greater representation in the formation of educational policy.)

• Visiting your state congressional or assembly representatives and education policy advisors

• Using digital media to get the word out about school programs and plans
While many policy decisions are made at the regional, state, or federal level, one area of policy that generally falls to individual districts is the establishment of an acceptable use policy (AUP) that addresses the dos and don’ts of technology use. Topics that should be addressed in an AUP include:

- Definitions of appropriate and inappropriate use
- Consequences for misuse
- Rules and resources for copyright compliance
- User liability expectations
- Student safety issues
- Network security and other issues related to maintaining a robust infrastructure

No school’s technology integration process will come without headaches and hiccups.

Rather than be frustrated or sidetracked, keep in mind why technology has become an important learning tool, and how it will be used to accomplish teaching and learning goals in your school’s classrooms. Diligent research, patience, and perseverance have the potential to produce a learning environment more engaging than ever before.

Bring Your Own Device

The issue of student-owned technology is, for many educators, a controversial one. Its proponents include Forsyth County Schools in Georgia, whose BYOD endeavors have been showcased on the NBC Nightly News Broadcast, where enthusiastic K-12 students could be seen using a wide variety of digital tools.

Meanwhile, in April 2012, the Georgia state legislature passed Act 619, which amended a number of aspects of the state’s codes governing elementary and secondary education in order to, among other things, “delete obsolete, unused, and unnecessary provisions.” One of those provisions was a ban on student-owned electronic devices in class, originally enacted in the days of beepers.

Not all educators, however, are rabid BYOD advocates. While 62 percent of those polled on the K-12 Blueprint site claim that BYOD offers real advantages that go beyond cost-savings, 29 percent say it’s a necessary evil “because it’s the only way we can afford one-to-one right now,” while just under 10 percent say they are opposed to BYOD under any circumstances.

In the field, opinion is similarly mixed. Jen LaMaster, director of faculty development at Brebeuf Jesuit Prep School in Indianapolis, says, “I look forward to watching bring your own technology programs grow and develop over time.” In contrast, Stephen
Baule, superintendent of North Boone CUSD 200 in Poplar Grove, IL, wrote an opinion piece cautioning districts to avoid leaping into the BYOD arena without giving careful thought to equity issues.

According to a 2011 EdTech Magazine report, there are five key ways to manage a bring your own device strategy:

1. **Be Flexible and Don’t Hamper Innovation.** “If you make a mistake and something happens in the classroom, it becomes a learning experience,” says Bailey Mitchell, chief technology and information officer for Georgia’s Forsyth County Schools.

2. **Foster Cooperation.** IT and academic departments must work together as equal partners—from planning to promotion.

3. **Share Best Practices.** Forsyth County Schools has developed a wiki in the district’s learning management system where teachers can share ideas, techniques, resources, and applications they have discovered.

4. **Provide Professional Development.** Before launching a seventh-grade pilot program in Cincinnati, OH, at the Nagel Middle School, Principal Natasha Adams asked instructional technology staff to tailor all professional development around BYOD. “We focused on 21st century learning and how kids can learn better using technology,” says Cary Harrod, instructional technology specialist for the Cincinnati-based Forest Hills School District.

5. **Educate Parents Too.** BYOD only works with parental buy-in. When Forest Hills officials surveyed parents, they discovered that the prevailing concerns were about online safety and the educational value of technology, accompanied by apprehension that devices might be lost or stolen. The district allayed fears by holding meetings with parents and students in which they demonstrated what the technology could do in the classroom.
**A Textbook Case for Progress**

In March 2012, FCC Chairman Julius Genachowski and Secretary of Education Arne Duncan hosted a discussion with senior executives and education technology leaders to discuss President Obama’s challenge that all K-12 schools should transition to interactive digital textbooks within the next five years.

Senior executives from technology companies such as Intel, Apple, and Samsung, and publishing companies, including Houghton Mifflin Harcourt, McGraw-Hill, and Pearson, were also in attendance.

Researchers from Project RED—an organization comprised of education and industry professionals with a passion for transforming education—shared information on the costs of print and digital learning environments, making the case that the transition to digital would save schools money, saving roughly $250 per student, per year, while offering new, engaging, and effective opportunities for learning.

The meeting organizers encouraged groups to work together to develop market-ready, model digital textbooks.

**Building a Bridge to Rural Appalachia**

The goal? Help Appalachian Ohio achieve state and national standards in broadband adoption by 2014.

The nonprofit organization Connect Ohio and its Connect Appalachia Broadband Initiative (CABI) task force are partnering with Intel Corporation to help bridge the digital divide that exists in Ohio’s Appalachian region. The task force is comprised of leaders from public, private, and government organizations with an interest in increasing broadband availability and use to Appalachian Ohio. It is working to improve access by using the successful efforts of Connect Ohio’s last-mile technical assistance team and the organization’s Every Citizen Online free basic computer and Internet training program.

In a recent report, Technology Barriers and Adoption in Rural Appalachian Ohio, Connect Ohio cites national statistics such as the gap between broadband access for the poorest Americans (less than 33 percent) and the richest (more than 90 percent), as well as the lack of access to any computer technology on the part of a significant percentage of rural households in the Appalachian region.
**Taxes Take a Holiday**

Several states, including Alabama, Georgia, Missouri, New Mexico, North Carolina, South Carolina, and Tennessee, have eliminated sales tax on back-to-school technology purchases. For education leaders, advocating for a sales tax holiday on laptop computers and other technology saves families money and helps businesses thrive.

States can help put more laptops in the hands of students by implementing a sales tax holiday that includes PCs. Making education more affordable at a time when families are concerned about mounting debt and saving for college makes smart sense. With laptops and other school supplies free from sales tax during a state tax holiday, families can save money and apply the tax savings to other purchases or set the savings aside for future needs. In a tight economy, every dollar counts.

### THE ARGUMENT FOR SALES TAX HOLIDAYS FOR TECHNOLOGY

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<tr>
<th>Challenge</th>
<th>Equip students with tools for today—and tomorrow:</th>
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<td></td>
<td>Whether students are college-bound or preparing for life in the modern workplace, they need versatile technology skills. A rapidly growing number of colleges and universities require laptops for incoming students, and being computer-savvy is a prerequisite for most 21st century jobs. Holding on to older computers because of lack of funds can create challenges, since they are often saddled with maintenance problems and downtime, and are far less energy-efficient or portable than today’s new models.</td>
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<th>Solution</th>
<th>Make new PCs more affordable in today’s struggling economy:</th>
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<td></td>
<td>States can help put more laptops in the hands of students by implementing a sales tax holiday that includes PCs. This important inclusion makes education more affordable at a time when families are concerned about mounting debt and saving for college.</td>
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| Impact   | Students prepared: Learners outfitted with laptops will be better equipped for today’s classroom and tomorrow’s workplace. Students are ready to take advantage of the digital learning opportunities that increasingly define modern education. |
|          | Money saved: With laptops and other school supplies free from sales taxes during a state tax holiday, families can save money and apply the tax savings to other purchases or set the savings aside for future needs. In this tight economy, every dollar counts. |
|          | Local economies boosted: In its first year of implementation, the state of Texas reported that its sales tax holiday boosted shopping 100 percent over comparable calendar days in previous years. Recently, the National Retail Federation endorsed sales tax holidays as substantial inducements to shop and as a means for preserving jobs. |
LEADERSHIP

Inspirational, supportive leadership is at the heart of every effective technology implementation. Change must indeed be modeled and championed at the top. Yet while school- and district-level leaders hold the key to the success or failure of a local program, strong leadership by state and federal policy makers can help change the culture of learning throughout the entire country.

Systemic change requires much more than placing laptops in student hands or bringing mobile carts into classrooms. For technology to play a role in systemic change, school and district leaders need to have broad and far-reaching goals—a vision for how technology can transform teaching and learning. In one-to-one programs, this means understanding how the technology can help a school reach all students, teachers, and administrators at all times, through a ubiquitous computing environment.

One factor significantly impacting systemic change is the level of administrative leadership, as demonstrated through such actions as involving staff in decisions, setting clear expectations for technology use, encouraging and participating in professional development events, and providing resources and support.

The education division of SIIA (the Software & Information Industry Association) developed a toolkit that offers suggestions to school leaders about the planning process involved in implementing a new program. Suggested steps include:

1. Determining the program’s objectives before planning proceeds
2. Involving all program stakeholders in the planning process
3. Including criteria for evaluating the program’s success in alignment with the program’s objectives
4. Assigning an effective leader, with appropriate decision-making authority, to manage the implementation

Strong leadership is crucial at all levels of large-scale technology implementations and education success measures. While a principal’s role is vital, all levels of leadership are important, both individually and collectively.

Effective leaders are people who are able to balance top-down and bottom-up approaches to planning and implementation. They are visionaries who know how to inspire and guide others. They understand how to nurture grassroots leadership, enlisting input from stakeholders and building an effective team to develop a collective vision and a strategic plan to get there. Included on the next few pages are some steps to help implement an expansive, successful technology-based initiative.
Identify Stakeholders

An effective initiative impacts the entire school community—administrators, teachers, students, IT staff, facilities and procurement staff, and curriculum specialists—as well as the broader community, including parents, board members, and local civic and business leaders.

Build a Task Force

Involve representatives of all the key stakeholder groups, to attain not only local perspectives but also to encourage the participation of state-level policy makers. Enlist the support of all key players who will play roles in the development of the initiative, while defining short and long-term goals for the initiative. This will demonstrate to stakeholders how the initiative will improve the quality and effectiveness of teaching while increasing student achievement.

Develop Teacher Buy-in

Since teachers are key to systemic change in the classroom, the professional teaching staff must be involved in the development phase of any new initiative. By giving the teachers a voice in the decision-making process, they gain true equity in the initiative. This results in the collaborative adoption of a shared vision rather than an ill-received directive. Assess additional skill sets. This the new equipment and data-driven decision-making solutions will
require and provide training for all skill levels. Blended professional learning, a combination of face-to-face and online learning, is generally accepted as the most efficient practice. Teacher morale is very visible to students, and it’s nearly impossible for change to take place if those responsible for implementing it are resistant or pessimistic about the outcomes.

Create a Strategic and Sustainable Plan

First, develop objectives for students, teachers, and administrators, and then align the objectives with district technology and content standards. Determine both how the program will be evaluated—how you will measure success—and the procurement policies for the initiative. Consider long-term funding and how to sustain the initiative over time while creating policy documents to guide the process and educate the participants. Lastly, review security and acceptable use policies, and revise them as needed.

Involve People, Process, Technology, and Data

A successful, strategic implementation considers four elements: people, process, technology, and data. Suggested steps include:

- Conducting a gap analysis of all four elements
- Researching and learning from the experiences of others
- Forecasting technical infrastructure needs, with an eye to increasing capacity over time
- Considering beginning with a smaller-scale pilot implementation or using a phased approach
- Seeking vendor expertise and partnerships to estimate project cost
- Knowing why you are implementing the technology initiative and what success looks like
- Studying the successes and failures of others
- Being open to large and small-scale
technology implementation ideas and solutions that other types of businesses use

Maximize Communication

Establish a task force focused on communication and employ 21st century technology tools—e-mail, Web sites, online user groups, wikis and collaborative documents, and blogs, for example—to support the planning and collaboration process. Hold special briefings for key stakeholders, detailing project progress. Share information and data collected with peers and other stakeholders. Prepare an accountability plan to communicate change management progress. Identify and include change-readiness tactics, impacts to individual jobs, policies and procedures, and an information flowchart outlining channels of communication.

Some Key Considerations

- Everyone impacted by an initiative has the potential to become a champion for the project.
- Explaining the impact of the initiative with clarity and early buy-in is vital.
- While broad representation is important, limiting the actual number of people on your task force is wise.
- Devise questions that will lead to discussions to help target key objectives, ideas, needs, and important input from all stakeholders.
- Find teachers and students who will become advocates for your vision, and help prepare them to be situational leaders who will foster and support change among their colleagues.
- Review your vision on a regular basis, making changes as needed.
- Measure results and use them to drive data-based decisions that have a solid foundation.

Just as technology initiatives are a drastic shift from traditional learning methods to dynamic, self-discovered tools and resources, school leadership must change dramatically as well to assure authentic school reform. Education leaders must stay abreast of new learning models, technology, and tools so they can share this knowledge with authority and real-world relevance. When integrated into teaching and learning, these resources allow for productivity in knowledge access, evaluation, and real-time content aligned with standards for students, educators, and administrators alike.

In the end, effective leadership helps ensure that technology-based initiatives are targeted and effective. Meaningful change is a deep commitment. And successful leaders realize that informed and gradual change is easier to accept and implement. Allowing adequate
time for all involved to communicate questions and concerns, and to make adjustments and suggestions that strengthen the mission and ensure success.

Take Five: New Publication Looks at the Keys to Successful One-to-One Initiatives

Produced with support from Intel and Educational Collaborators, Five Key Factors for One-to-One Success is a free guide from DyKnow featuring a number of leading education technology experts sharing ideas and best practices.

#1: INSPIRATIONAL LEADERSHIP

Thought leadership is perhaps the most critical component for any organization. Guidance and direction are essential to the success of new endeavors.

Greg Klee, an often-consulted resource on successful one-to-one computing programs, insists that “Pragmatic leadership is important. You need the cheerleaders and the pragmatics to make it work. You also have to remind everyone that this is about learning... it’s not about the device.”

Spearheading a new opportunity requires a thick skin and a level head. Provoking and advancing unconventional ideas also requires courage and plenty of reinforcement, but has great potential to energize and excite teachers, students, and other constituents.

#2: A CLEAR MISSION

Losing sight of your learning goals or forgetting to base your technology initiatives on them in the first place can be detrimental to measuring the success of your program. At some point, constituents will need proof of your success and firm data to back it up. Establishing a technology initiative grounded in your school’s mission statement is a sure way to get your program off to a solid start.

Eric Bowser, Supervisor of Technology for Upper Valley Career Center, believes the mission statement is one of your greatest assets to kicking off an effective program.

“We wanted to extend the ability of our students to work on assignments
and projects while outside the school walls and the traditional school day. A one-to-one program moves us in the direction of overcoming the digital divide. We made a huge leap when we got past trying to justify the cost based on some form of the return on investment.”

#3: PLANNING WITH HELP FROM A REPRESENTATIVE THINK TANK

Forming a think tank for your technology initiative helps big decisions remain grounded in thoughtful research and planning. Using professional development organizations, like the reputable Educational Collaborators™, is an excellent resource for better understanding and implementing EdTech Think Tanks with a multitude of experiences amongst their practitioners.

Coming from a background in classroom teaching and education technology advocacy, Karen Montgomery understands issues and trends in education. Her role with Educational Collaborators (EC) includes customized assessment services for schools to support meaningful technology integration.

“We’ve worked with some schools that are going to need broad community support, perhaps for a bond. In this case Think Tanks include city council and/or members of the Chamber of Commerce.” It’s all about looking at your culture and assessing if your culture is ready to go one-to-one.

“The time of preplanning and deployment based on self-reflection will reduce and sometimes eliminate many of the problems schools have during implementation.”

#4: SUPPORTIVE AND CONTINUOUS FACULTY DEVELOPMENT

Administrators and teachers must understand why and how classrooms will change, and what their role in these changes will be. Constant communication, guidance, and support must exist to build confidence and adoption among faculty members, because the success of the program hinges on them. Beth Budd, technology coordinator at Archbishop Alter High School, stresses the importance of encouraging teachers to attend conferences, such as Laptop Institute, that are geared toward one-to-one learning. “Before beginning our one-to-one initiative we did two important things: we provided training on the software we were going to use in a classroom setting with a trainer as the teacher and teachers acting as students, [and we took] ten teachers to Laptop Institute for training. It provides teachers with the experience of seeing other educators who teach in one-to-one schools using their tools and answering questions. They can bond and share their learning experiences.”

Teachers need to see examples of
how students learn differently with technology. They need to read about it, see it for themselves, and put their hands on it. Rewarding educators who take time to learn a new skill is important, and achieving this amongst peers gives teachers time to learn in a fresh, encouraging environment.

“Teacher frustration with hardware and/or software is a killer for technology integration. When a teacher experiences a problem, they must know that help is available to them. This help must be quick and on the understanding level of the teacher using the technology.”

#5: ASKING FOR HELP FROM THOSE WHO HAVE ALREADY IMPLEMENTED ONE-TO-ONE

Simply put, there is no need to reinvent the wheel. Lean on your colleagues from other schools who forged this space before. You are not alone! Experts in one-to-one computing initiatives did not achieve success overnight, and you should not anticipate instant mastery either. Also, remember this new technology should be founded in existing pedagogical and curricular goals, so frustrations with infrastructure pale in comparison to the learning potential this opportunity presents.

Elizabeth Helfant’s role as coordinator of instructional technology at Mary Institute and Saint Louis Country Day School in St. Louis, Missouri, was created to maximize the potential of their one-to-one tablet PC program. Elizabeth has experience teaching as well as coaching teachers toward meaningful education technology integration. The school saw a need for an initiative champion who would nurture the program and ensure its success. Elizabeth was a perfect fit.

“Our labs were full and we had been integrating tech into the curriculum for years [but] we had voted we were not ready for one-to-one for several years before we moved to tablets. It’s all part of creating a good learning environment. You don’t get to focus on just one piece of the puzzle; they all matter.”

In her role at MICDS, Elizabeth routinely asks for and receives feedback from the faculty and students in regards to what they like, what is working, and changes they would like
to see made. “We survey [students and teachers] from time to time, and occasionally, I meet with kids to get their thoughts on where stuff is working and where it isn’t.” An open and honest line of communication is a simple concept that can reap huge rewards.

**The Perfect Blend**

The term *blended learning* seems to evolve daily. What exactly does it mean? A white paper by Innosight Institute Executive Director Michael B. Horn and Senior Research Fellow Heather Staker attempts to answer this vexing question.

Based on input from roughly 100 education experts and 80 organizations, the paper—*Classifying K-12 Blended Learning*—provides an improved definition of blended learning: “A formal education program in which a student learns at least in part through online delivery of content and instruction with some element of student control over time, place, path, and/or pace and at least in part at a supervised brick-and-mortar location away from home.”

The white paper identifies four models of blended learning and highlights four new submodels. It also diagrams several education practices often mistaken for blended learning. According to the report’s authors, “Our hope is that advancing a common language will help educators frame the issues and not talk past each other.

Language should not be the bottleneck to innovation.”

One common feature of blended learning is that what the students learn online informs what they learn face-to-face, and vice versa. Furthermore, if students have control over their pace, this control often extends to the entire subject, not only to the online-learning portion.

Digital Learning Now!—a national campaign to advance policies creating high quality digital learning environments—describes blended learning as involving control over time, place, path and pace.

- **Time:** Learning is no longer restricted to the school day or the school year.
- **Place:** Learning is no longer restricted to the walls of the classroom.
- **Path:** Interactive and adaptive software allows students to learn using methods customized to their unique needs.
- **Pace:** Learning is no longer restricted to the pace of an entire classroom of students.

Finally, the growth of online learning in higher education has taken off. According to “Disrupting College: How Disruptive Innovation Can Deliver Quality and Affordability to Postsecondary Education,” roughly 10 percent of students in 2003 took at least one online course. By the fall of 2009, that number had grown by 20
points, and it is expected that half of all postsecondary students will take at least one class online by 2014. This dramatic change is influencing the way K–12 programs are thinking about how to prepare kids for success in college.

**Emerging Technologies to Watch**

The [Horizon Report](http://horizonreport.nmc.org/) has been published since 2002 and is the result of collaborative effort fostered by NMC (New Media Consortium). It highlights emerging technologies that impact teaching, research, learning, and creative inquiry. A timeline is created, which details when these technologies are set to have the most impact in those areas.

According to the 2012 Horizon Report, the following are the emerging technologies most likely to impact teaching and learning in the next few years:

- Tablet computing
- Game-based learning
- Learning analytics
- Gesture-based computing
- Internet of things

Any school or organizational leader will realize by looking at the Horizon Report’s technologies list how quickly these changes are impacting our world.
and indeed our own lives on a daily basis. Other insights gleaned from the report include:

- Traditional models of education are giving way to new models due to economic pressures and student need.
- The role of educators is undergoing change in light of an abundance of resources and relationships.
- Blended learning via online programs, hybrid learning, and collaborative models are taking hold.
- Working and learning are anytime, anywhere activities.
- Cloud computing is becoming more common and IT decentralized.
- Classroom learning is becoming more active and challenge based.
- Student work is becoming more collaborative as work and learning organizations are moving to collaborative and collective models of work.
- New metrics for evaluation are needed in a web-centric classroom.
- New publishing models, such as social networks, are challenging traditional research and scholarly resources, putting pressure on libraries and schools.

School and organizational leaders are advised to take a close look at the results of this report and to take action on behalf of the population and students they serve. Fostering a relevant, engaging learning environment in tune with today’s world is the job of visionary leaders.

**Going Mobile**

Mobile applications, or apps, are often an instantly engaging way to stimulate a student’s interests. Apps are valuable, easy-to-use tools that educators should consider using, allowing collaboration and communication on convenient, portable devices such as smart phones and tablets.

Today’s students are comfortable in a digital world, and educational tools, such as mobile apps, allow seamless connectivity to subjects both inside and outside the classroom. Mobile apps allow access to educational resources across the globe with just a few taps. Students can even blog about their educational experiences and share
them with others instantly, anywhere, anytime.

The widespread use of mobile devices also allows teachers and educators to perform tasks such as share notes, download materials, and send instant messages to colleagues without breaking the flow of instruction. Mobile apps are simple, effective, and non-intrusive way of introducing digital learning into the classroom.

**FUNDING**

If policy is the “brains” behind an education technology initiative, then funding is surely the life-blood.

Almost everyone involved with K-12 education today would agree that giving students access to the latest education technology is crucial to building essential 21st century skills. Yet the issue of funding these initiatives is far more complex. The costs and complexity required to implement technology programs are enough to discourage even the most valiant educator or administrator. Such programs are also a considerable investment in time, especially when seeking funding to launch and sustain your ambitious educational technology programs.

A large number of one-to-one implementations have failed when the hardware has aged and the money has run out. But for every unsuccessful attempt, countless other schools and districts facing a variety of unique economic and resource challenges
have launched or expanded winning technology projects.

Even though the economy is lean, our country strongly desires to improve science, technology, engineering, and mathematics (STEM) learning. STEM is viewed as a driver—the next wave of technology-fueled collaborative learning—to increase our nation’s competitiveness. That is why funding for STEM subjects—where technology can help bridge the gap between the United States and other countries—is available from more sources than ever before.

Bonds, grants, levies, donations, federal funding, and local partnership are just some of the ways that shrewd education leaders have funded their programs. The key is to assemble a great team, seek out help and support, and make progress one step at a time. And, when planning for new technology or expanding an existing initiative, two aspects of budgeting must be considered: the initial costs and ongoing funding to support the program over time.

**Initial Investment**

Launching a one-to-one laptop program or other major technology initiative requires funding that goes well beyond the usual cost of equipping classrooms for a new school year. Fortunately, these initial costs can often be covered by special-purpose funding.

**Foundation Grants.** Numerous foundation grants are accessible to school districts. Millions of dollars are available—some grants are given on a one-time basis, while other grants are renewable annually, depending on the results of the implementation. Many foundations in the private sector allocate funds to schools willing to create the innovative learning environments necessary for students to develop into successful workers in the 21st century.

**Community Bonds and Allocations.** Local bond issues have been successful in locations such as Irving ISD in Texas, where parents and community members work closely together, confident in the positive effects such measures can have for students and local economies.

**Statewide Pilots and Seed Funding.** Although a tight economy has made launching new technology programs difficult for many states, some states are continuing to support ambitious 21st century initiatives. One example is Maine. The Main Learning Technology Initiative (www.maine.gov/mlti) is pioneering a one-to-one middle school laptop program and has recently begun expanding its efforts to high schools. The high school funding is more limited than that available to the middle schools involved in the first phase of the program, but the state has been involved in negotiating affordable lease
prices, and providing infrastructure and professional development.

The adoption of a 21st century learning environment—and the wide variety of tools required for success—is not solely a capital investment. While the act of bringing in huge quantities of computers and software applications seems like it would fall into the capital portion of a budget, other relevant budget categories include textbooks/instructional materials, curriculum development, technology funding, and facilities upgrades. Spreading out the costs, instead of lumping them into one category of the budget, can make a huge difference to the success of funding a technology initiative.

Funding technology from your regular operating budget also allows technology to be integrated into the curricular budget, paralleling the integration of technology into your curriculum. School operating budgets provide stable financing for ongoing purchases and support. With that said, given the current state of school budgets, schools may cut back on technology programs and support staff if they are contained in the regular operating budget.

**Ongoing Costs and Cost Savings**

When considering a one-to-one implementation or other major technology initiative, schools must first determine the total cost of ownership (TCO). Examples of ongoing expenditures include hardware maintenance and replacement, subscription fees for premium online content, and the cost of professional development. Schools that are embarking on an ambitious technology initiative should expect to set aside a percentage of their annual operational budgets to support it. Possible sources of support for ongoing initiatives include:

**Grants.** In addition to funding initial investments, a number of foundations are willing to provide ongoing support for programs that have proven themselves worthy.

**Discounts.** Whether through the federal eRate program or partnerships with local service providers, schools are often eligible for discounts on online services and technical support.

**Support from Local Organizations.** Many companies, higher education institutions, and civic organizations recognize the value of supporting local schools in their efforts to provide today’s students with 21st century skills. Hardware donations and programs placing volunteers in the schools to provide technical support and education to students and teachers are just two examples of ways that local organizations can help schools while reaping both tax and public relations benefits.
Community Partnerships. Many districts have recognized major benefits and cost savings by working with local leaders on mutually beneficial initiatives, such as wide area networks that serve both the schools and other aspects of the community.

Family Contributions. Most one-to-one initiatives today charge a nominal fee to families that are signing out computers for 24/7 use. These fees typically cover insurance or other costs related to computer maintenance. To ensure equity, most of these districts will waive such fees for families who cannot afford them.

In addition to looking for innovative and realistic approaches to TCO budgeting, looking for ways in which the innovative use of technology can actually save districts money is also important. The long-term effects of one-to-one adoption, for example, can reduce an annual budget after one year. Now that states are loosening restrictions on textbook purchases, some districts are using funding formerly used for traditional print content to pay for less expensive online curriculum and other digital content. In another example, a school’s communication costs could be drastically reduced as schools begin corresponding with families through the same one-to-one technology employed by students.

Policy makers can consider some new alternatives to the funding conundrum. Schools can consider using the technologies that students already own or adapt their systems to accept any laptop within certain standards (a policy known as bring your own device, or BYOD). Many schools are implementing BYOD programs, where students can bring their own laptops from home and join school networks through student-specific log ins. Initiatives to purchase laptops or digital tablets for students who do not own a device can also be implemented as supplementary measures.

Parents are a primary influencer of bond issues and other funding measures, so schools need to develop parents as both information sources and spokespersons.

President Vows Commitment to STEM

In 2012, at the second annual White House Science Fair, President Obama congratulated students for their exciting and meaningful projects, and pledged new money for STEM education. The fair celebrated the student winners in a broad range of science, technology, engineering, and math (STEM) competitions from across the country. More than 100 students, from all over the United States, represented over 40 competitions and organizations.

The White House said the National Science Foundation would invest more than $100 million to improve undergraduate instruction practices, including in community colleges and
heavily minority institutions. The NSF and the Education Department will each contribute $30 million toward incentives for math education in elementary and high schools.

As for private-sector efforts, more than 100 executives agreed to invest and participate in 130 programs nationwide. And the administration highlighted a joint initiative of Time Warner Cable, which it said committed more than $100 million, and the entertainer Will.i.am to challenge young students to invent things with practical applications to their lives. The administration had previously set a goal of 100,000 additional math and science teachers and one million more graduates over the next decade.

More than 30 PSD teachers participated in professional development offered with support from Intel.

“When students have their own technology device, the engagement factor goes through the roof, and kids want to come to school,” said instructional technology integration coordinator Monique Flickinger. “The learning opportunities are endless.”

Unsure of Self-Insurance?
Most one-to-one programs charge a small insurance premium for loaners

Laptops Fall into the Laps of Colorado Ninth Graders

A voter-approved bond initiative has enabled Colorado’s Poudre School District (PSD) to launch a one-to-one initiative for its high school students.

The laptop program began in 2012 with a single high school and has been rolled out gradually over the course of the school year. When freshmen at Fossil Ridge High School were issued their laptops, ninth graders at all four of the district’s comprehensive high schools were equipped with school-owned computers to use for the remainder of their high school career.
that go home with students. For initiatives involving district-owned computers, usually the family is asked to pay a small, annual insurance fee—typically $50 to $70 per student.

Until recently, USD 490, in El Dorado, Kansas, paid $41,000 a year to an outside insurance company, but they typically had only $4,000 to $5,000 in claims. The district decided to self-insure, and the director of fiscal services hopes that the savings might enable the purchase of additional laptops.

Similarly, the Upper Marion Area High School in King of Prussia, Pennsylvania, decided to self-insure after finding that insurance-related incidents with a pilot one-to-one program were quite small—only 2 to 3 percent.

Helping a Community Rebuild after Disaster Strikes

A tornado devastated Joplin, Missouri, moments after the city’s 2011 high school graduation ceremony, killing 160 people and causing enormous damage to homes, churches, businesses, and schools. Yet, through hard work and two ambitious technology initiatives, this resilient community is rebuilding its schools and its future.

This left the district’s technology director, Traci House, to oversee a mammoth effort to rebuild the schools’ technology infrastructure and to fast-track two technology programs that had been in the planning stages before the tornado—an online learning program and a one-to-one initiative.

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Tools to Help Anticipate Project Costs and Plan for Implementation

The One-to-One Institute’s Dynamic Technology Planning Program

The One-to-One Institute has developed a “Dynamic Technology Planning Program” to facilitate the sustainability and replicability of highly enhanced education technology learning environments, such as one-to-one teaching and learning programs. It is a technology projection tool that gives school leaders the ability to easily and systematically plan and communicate their short- and long-term technology visions, needs, costs, and funding sources. As a multi-year planning tool, it provides a step-by-step approach to:

- Developing a short- and long-term vision for systemic funding of technology
- Determining resources needed to implement the vision
- Calculating current and future implementation costs
- Identifying funding sources
- Communicating the technology plan

For more information, go to www.one-to-oneinstitute.org
According to House, “When you are desperately rushing to open school in 86 days, you definitely think about how incredible it would have been to have had an extensive number of online classes already set up. Blended learning is now playing a very key role in our educational process.”

In addition to blended learning, the other technology initiative was a one-to-one initiative supported by a $1 million grant from the United Arab Emirates. It took a massive effort but House’s team pulled it off—rebuilding the wireless infrastructure; purchasing, unpacking, and imaging 2,200 laptop computers for the district’s high school students; and offering professional development for the teachers—just in time for the start of the school year.

**CURRICULUM AND ASSESSMENT**

Technology can play a huge role in increasing educational productivity, but not just as an add-on or for a high-tech reproduction of current practice. To implement meaningful change, educators need to change the underlying processes to fully leverage the capabilities of technology. If technology is to be truly an effective aspect of education, it must be thoughtfully woven into the entire fabric of the school and learning.

At the core of any student-centered technology initiative is the question of how it impacts teaching and learning. Teacher involvement, clear program goals, and assessment measures, and a sharp vision for how curriculum, content, and instruction need to evolve in order to prepare students for the challenges of the future are all essential.

Success is about giving each person the tools they need to succeed—reducing wasted time, wasted energy, and wasted money. The best strategy for boosting productivity is to leverage transformational change in the educational system, improving the academic outcomes of children. To do so, requires a fundamental rethinking of how we structure and deliver education in this country.

According to the U.S. Department of Education’s 2012 report “Understanding the Implications of Online Learning for Educational Productivity,” nine applications of online learning are seen as possible pathways to improved productivity:

1. Broadening access in ways that dramatically reduce the cost of providing access to quality educational resources and experiences, particularly for students in remote locations or other situations where challenges, such as low student enrollments, make the traditional school model impractical.

2. Engaging students in active learning with instructional materials and access to a wealth of resources that can facilitate the adoption of research-based principles and best
practices from the learning sciences, an application that might improve student outcomes without substantially increasing costs.

3. Individualizing and differentiating instruction based on student performance on diagnostic assessments and preferred pace of learning, thereby improving the efficiency with which students move through a learning progression.

4. Personalizing learning by building on student interests, which can result in increased student motivation, time on task, and ultimately better learning outcomes.

5. Making better use of teacher and student time by automating routine tasks and enabling teacher time to focus on high-value activities.

6. Increasing the rate of student learning by increasing motivation and helping students grasp concepts and demonstrate competency more efficiently.

7. Reducing school-based facilities costs by leveraging home and community spaces in addition to traditional school buildings.

8. Reducing salary costs by transferring some educational activities to computers, increasing teacher-student ratios, or otherwise redesigning processes that allow for more effective use of teacher time.

9. Realizing opportunities for economies of scale through reuse of materials and their large-scale distribution.

Digital curricula can be a dynamic, transformative tool to enhance learning exponentially.

Digital resources allow students and teachers to create timely content that is relevant and meaningful, not static and outdated. And in contrast to costly textbooks with a limited lifespan, digital content uses engaging electronic media to expand an educator’s ability to meet diverse student needs while offering avenues for differentiation.

Quality games and simulations provide learning opportunities beyond textbooks, providing a deeper learning experience that requires problem-solving skills. When engaging with a digital curriculum, educators and students alike become critical explorers, agile problem solvers, and communicators who use imagination and initiative to guide the teaching and learning processes.

Students explore and shape content so that it provides true understanding. Where students would traditionally perform static research and produce
written reports, digital resources allow them to explore topics in a more dynamic fashion and use multimedia tools to produce rich educational experiences.

Where students would once wait long periods of time for feedback, formative assessments delivered via online tools allow for immediate feedback that students can use right away. Online tools also allow for fluid collaboration and interaction, whether among students, teachers, or parents and the community at large.

Students who collaborate with peers are more highly engaged, and benefit from support, discussion, and feedback. Increased communication with teachers helps students improve their performance. Productive partnerships with the subject-specific experts in the community fuel a relevant, real-world approach to teaching.

Some Guidelines for Incorporating Technology into the Curriculum

• Technology should support student activities that would otherwise be difficult or impossible
• Technology should be equitable and address all learning styles
• Curriculum should be developed with the vast new set of digital content in mind

Digital content packages can:

• Address individual learning styles
• Be flexible
• Be quickly adjusted to fit ability levels
• Be translated into multiple languages
• Be reformatted for presentation and dissemination in various ways
• Include graphic, video, virtual reality, animations, simulations, audio, music, interactive, and gaming elements

With effective professional development, teachers should feel well prepared and equipped to inspire such learning activities as:

• Planned and spontaneous research
• Evaluating the reliability of various online sources
• Taking notes quickly and efficiently
• Peer mentoring using multimedia presentations
• Writing and editing using a variety of tools

Technology Considerations for K-12 Education

• Tablets
• Mobile devices
• Technology-based monitoring of student progress
• Cloud computing
• Digital gaming
• Social networking
Adaptive learning environments
Electronic textbooks
Simulated environments

Self-directed and self-paced, digital curriculum, and assessment tools allow for the ultimate in personalization and student-centric learning—online and in-line with each student’s unique learning needs. Teachers determine where each learner is on their academic path and can correct problems with adjusted, personalized instruction.

Technology has tremendous potential to transform teaching and learning, although our nation’s classrooms will not change for the better simply by infusing technology into them. Teacher buy-in, effective professional development, and a vision for the ways in which curriculum and instruction need to evolve in order to educate students for a rapidly changing world are all essential to such a transformation.

Get Ready, Get Set, Get Online

States throughout the country will be moving to online summative assessments based on the Common Core State Standards beginning with the 2014-15 school year. A consortia of four states are developing these assessments with funding from Race to the Top Assessment (RTTA) grants.

To help states and districts make the move to online testing, the State Educational Technology Directors Association (SETDA) has created Assess4ed.net: an online resource providing webinars, online discussions, and open source tools to support staff.

Assess4ed.net is a collaboration between SETDA and the Partnership for the Assessment of Readiness for College and Careers (PARCC) and the Smarter Balanced Assessment Consortium. Together, these next-generation assessment pioneers give schools the tools they need to better evaluate if they have the technology infrastructure in place to support online summative testing based on the Common Core State Standards. For instance, districts can assess their readiness in such areas as the number and types of devices available to students, bandwidth and network capacity, and personnel capacity available for technical support. The site even provides an Internet Broadband Speed Test, offering K-12 schools real-time information on their broadband connection speed and quality.

New High-Tech School to Launch in NYC

In his state-of-the-city address in 2012, New York City Mayor Michael Bloomberg announced plans for a new technology-focused high school,
known as the Academy for Software Engineering, designed to meet the growing need for software engineers while strengthening New York City’s position as a high-tech hub.

The Academy—which opened in September, 2012—is housed at Washington Irving High School in Union Square. The school promises incoming 9th graders innovative software engineering and computer science skills and knowledge; internships in New York City’s tech industry with professional mentors; the latest workstations, equipment, and approaches to keep you engaged; computing courses focused on programming, advanced

computer science, web design, user experience, entrepreneurship, and mobile application development.

Applicants are selected through a “limited unscreened” approach, in which grades play no role. Instead, priority is given to Manhattan students who have demonstrated a strong interest by attending an open house.

A Disruptive Path Towards Innovation

In their book, Disrupting Class: How Disruptive Innovation Will Change the Way the World Learns, Clayton Christensen, Michael Horn, and
Curtis Johnson highlight the exciting changes underway in K-12 as new technologies are adopted and learning is increasingly personalized.

The authors describe disruptive innovation as an innovation that transforms an existing sector—bringing convenience, simplicity, accessibility, and affordability.

Just as the personal computer “disrupted” the computer industry, online learning represents an opportunity to give learners new levels of personalization and independence. In fact, the authors project that 50 percent of all high school courses will be delivered online by 2019.

The challenge is overcoming what they see as the “standardized batch model” of testing and educational delivery, designed to serve the needs of the institution but not necessarily the learner. Instead, schools need to provide “student-centric” systems.

According to the U.S. Department of Education, in 2009, more than 3 million students took an online learning course—up from a mere 45,000 in 2000.

Considering today’s funding constraints on schools (what Department of Education Secretary Arne Duncan calls, “the New Normal”), blended learning—where students rely on
online technology to attain greater personalization in adult-supervised environments—is proving an attractive alternative for schools that must do more with less. Indeed, it promises to deliver better results—through personalization—at lower cost than conventional classroom education.

In a survey of 44 blended learning programs, the Innosight Institute found that such approaches made it possible for students to move at their own pace and achieve mastery in their subjects, while enabling teachers to play the role of guide and advisor—focusing on helping students overcome key hurdles in their own learning paths.

“Through online learning, students can proceed down different paths, thus creating a more constant, mastery-based environment based on competency models,” says coauthor Michael Horn. “This is an exciting transformation that’s certain to lead to more upheaval of traditional systems in the next 10 years.”

**INFRASTRUCTURE**

Districts and schools are working to find cost-effective solutions for education IT that support quality teaching and learning, as well as streamlined administration and management. District leaders must consider infrastructure issues ranging from the choice of mobile computing devices to wireless networking and security.

**Computing Devices**

Selecting computers for a 21st century initiative goes far beyond choosing a manufacturer. Program planners need to determine student-to-computer ratios, the number and uses for desktop models in the overall picture, and the sorts of mobile devices that will best suit their needs. While most one-to-one programs in years past made use of laptop computers, a number of districts today have chosen to adopt tablet PCs or netbooks.

The ideal mobile computing device for school use:

- Is lightweight and sturdy
- Is provided to students in a protective carrying case
- Has several hours of battery power
- Has wireless capabilities and appropriate software
- Offers sufficient storage
- Includes USB ports and other options for expansion

In selecting such devices, a school should consider:

- Exploring the pros and cons of tablet devices vs. standard laptop technologies
- Implementing a battery exchange plan
- Providing written usage guidelines and establishing security measures
- Providing on-site docking and recharging stations
• Planning on a three- to five-year equipment life
• Standardizing hardware and software throughout a school, district, or program
• Establishing technical specs based on project goals
• Making software upgrades easy
• Establishing plans for maintenance and support
• Installing instructor workstations and management tools that permit teachers to view students’ screens during class time
• Making it easy for students to transmit and collect assignments wirelessly
• Buying the best devices the school can afford

**The Network**

Solutions that support student devices along with system management software are gaining in popularity.

Just as important as the computing devices in use by students and teachers is the network that supports these devices. A lack of appropriate network infrastructure inhibits the usefulness of even the most modern devices. Policy makers may want to require that local education authorities provide appropriate infrastructure and support plans for devices purchased with public funding.

A solid technology infrastructure and maintenance/service plan must:

• Ensure connectivity and access points
• Provide stable, secure, and reliable connection, inspiring trust on the part of users
• Perform daily operations smoothly and effectively, even with a large number of simultaneous users
• Support ongoing professional development and maintenance
• Be easily scalable to allow for future growth, including additional computers, servers, and peripherals
• Include support policies and procedures
• Pay attention to charging and storing needs
• Ensure on-site presence by technical personnel
• Develop teacher and student troubleshooting skills

**BRING YOUR OWN DEVICE**

Educational institutions face a unique challenge. They have a variety of users—students, teachers, staff, administrators—each requiring different kinds of applications, levels of access, and security. Serving these diverse user segments has always been a complex challenge for academic IT staff.

Educators need to ensure that all students are receiving a consistent learning experience, no matter what
device they are using. IT must, meanwhile, meet stringent security requirements, such as protecting student data, assessment, and controlled Web access.

Bring your own device (BYOD) policies can be a double-edged sword. Embracing the broad usage of individual mobile devices is both a significant savings in terms of technology purchase, yet has the potential to become a significant support, security, and infrastructure drain.

The five key differences between personally owned and school-owned devices—according to the 2012 Alberta Education publication, Bring Your Own Device: Advice for Schools—are:

1. **Familiarity, transparency, and facility with the device by the students.** A personally owned electronic device is exactly that, personal, and won’t necessitate a learning curve for students. Students are often quite proficient with their devices and will be less intimidated by digital curriculum if they interact with devices they are familiar with. Such devices afford seamless opportunities for anytime, anywhere learning.

2. **A seamless bridge between formal and informal learning.** If the devices the students use beyond school are the same ones they use for school, the students can seamlessly switch from personal use to learning anytime, anywhere. The learning activities on the device are accessible to the students 24 hours per day, 7 days per week, enabling them to pursue personal interests associated with such learning. The students can have access to academic learning that can be called up at a moment’s notice.

3. **Currency and immediate traction.** Encouraging personally owned devices can result in unprecedented levels of access to technology in the classroom. Teachers
can leverage the technologies that are available in class by organizing student work in teams that require a single device. While these same outcomes are possible with school-owned devices, many schools will not be able to get close to ubiquity anytime soon without introducing BYOD models. School authorities find that once a BYOD model is in place, they can also expect that number to increase even more after the winter break, since many students receive devices as gifts during that time period.

4. Social creation of knowledge. Students learn more when they are actively collaborating and cooperating with peers, their teachers, and other experts. One of the common uses of personally owned devices by students is in online collaborations with peers after school, about their school work. While such collaborations could be done on home computers, using the same computer in and out of school facilitates access to work in progress.

5. Cost and sustainability. Faced with the lack of budgetary capacity to provide adequate numbers of up-to-date devices to meet teaching and learning needs, school authorities began to consider BYOD models. However, most school authorities have found that their costs are not reduced, but rather redirected to network reconfigurations and the increased bandwidth required to support the BYOD model. The shift from investments in devices to investments in network infrastructure and bandwidth, combined with the increased number of devices available to students for learning, translates into increased access.

Support

Beyond purchasing equipment and installing the network infrastructure, IT leaders need to support their investment. Support guidelines include:

- Allow for ongoing staff and teacher training, as well as computer maintenance and support in operational budgets.
- Schedule regular communication and collaborative meetings with parents, teachers, students, and support staff to address issues. Efficient problem-solving up front prevents minor issues from escalating into major problems.
- Log, track, and analyze reports to determine technical weakness and ensure that needs are being met.
- Use students to help maintain equipment and support users. This approach challenges advanced students while reducing the load on IT staff.

Options to support these new services include:

Mobile Platforms. Advances in mobile technology mean that students and teachers now have the processing
power and storage capability to accommodate today’s applications, and to do so either in the classroom or in other locations. Even as mobile devices evolve, though, IT maintains the control of applications and operating systems.

Virtual Desktop Infrastructure (VDI). Thin-client desktop devices benefit from lower licensing and maintenance costs. These devices communicate with VDI servers, which deliver the software applications and operating systems. All data is automatically housed in the data center, increasing data security.

Server Capacity. Using hybrid client solutions, schools can reduce the amount of physical space needed for servers. The servers can be consolidated in one site to provide a centralized private cloud or even a virtualized solution—where applications and even operating systems can be served on-demand to devices throughout a school or school district.

Cloud Services. Cloud services, whether internal or external, can be used to augment classroom or data center servers. Schools should look for cloud service providers who offer compliance with regulatory requirements—such as the Family Educational Rights and Privacy Act (FERPA)—as part of their service-level agreement, which can reduce the time internal IT staff must devote to compliance.

With the right infrastructure, schools can offer anytime, anywhere access for students, educators, and families; support data-driven decision-making; facilitate collaborative and connected learning environments; support differentiated learning, allowing students to learn at their own pace and in their preferred styles; improve communication between school and home; and develop partnerships both locally and globally.
As a result, IT can help schools meet the demands of the present, while effectively creating a scalable, reliable graduation toward the future.

CLOUD WITH A SILVER LINING

In the 21st century, however, academic IT can advance technology solutions while lowering complexity. With the availability of new technologies, IT can deploy appropriate desktops and back-end systems for the appropriate segment of users. In addition, these new technologies give cash-strapped school districts a computing model that avoids forcing a choice between rich, interactive content and cost-effective deployment and management. They combine the best of both worlds.

Cloud solutions can bring significant benefits to classroom environments, while simplifying management and software licensing for IT. Teachers and students can access a wide range of digital content and services via cloud—from digital textbooks, labs, and online classes to assessment and creation tools—to support collaborative learning across devices. But cloud can also raise security and manageability concerns. A solid cloud solution can:

- Increase access to rich learning resources and services, including a wide range of applications, while aligning to state standards
- Access assessment data for individual goal-setting and tracking with students
- Increase parents’ visibility into student progress
- Deliver the best experience possible, based upon the device
- Increase agility, security, and productivity, and decrease IT expenditures
- Scale for growth, without expanding infrastructure or facilities

The Poway Unified School District in California uses Intel’s Stoneware cloud platform to provide a breadth of permissions-based access to teachers,
students, staff, and parents through a single sign-on portal. Reports populated with the latest data and test scores help create a collaborative environment, where teachers can work with students individually to set goals as well as compare student achievement to state and local standards. Real-time data gives students a clear, ongoing record of where they are and what they need to learn.

The cloud solution also gives teachers the flexibility to choose applications and curricula materials that best suit their teaching methodology and the needs of individual students. As it is to every school and district meeting state and federal privacy regulations, data security is critical to Poway. While users have easy access through their Web browsers, all activity is secured and controlled in the private cloud. This enables Poway’s IT staff to deliver data without jeopardizing network security.

PROFESSIONAL DEVELOPMENT

As classrooms move to more digital curriculum, teachers must be prepared appropriately, and additional professional development must be provided to ensure the success of any education technology initiative.

Technology-transformed schools call for different skills than those required in traditional industrial-age schools. Initiative leaders must develop insights and skills so that thoughtfully infused technology can create a generative teaching and learning environment. Students need guided practice in media and Internet literacy, which calls for agility and flexibility on the part of educators.

Phenomenal outcomes can occur when in-the-trenches educators are armed with the skills they need. But simply handing out technology and hoping for the best is an ineffective plan. Professional training for educators is crucial to assure the effective application of web-based resources in the curriculum, translating into student achievement.

Professional development is one of the most frequently overlooked aspects of implementing a technology initiative. Effective professional development goes far beyond one-time training sessions designed to introduce new technologies. It is ongoing, frequently reinforced, well-supported, and embedded into the daily life of schools.

To be effective, education leaders must constantly scan the environment and review new learning models, technology, and tools, and quickly assess rapidly changing knowledge sources. Education leadership programs need to support lifelong learning for administrators to make sure they can keep pace with the skills required for the 21st century. School boards and district administrators must simultaneously standardize expectations and accountability
systems to help leaders develop and practice effectiveness in today’s schools.

Increased internal capacity for fostering teacher growth decreases external support costs. Virtual experiences, for example, are cost-effective because they eliminate the costs of travel and substitutes. When educators become coaches and resources for each other, they begin to expect growth and use best practices, leading to increased student success. Coaching and mentoring are ideal for adult learning because these professional interactions help all involved to hone their skills by applying knowledge on the job, translating to more effective classroom practices.

**Before Implementation**

Professional development for all educators, including principals, must be funded in the school budget to support the retooling of teaching practices, improved student outcomes, and higher performing schools. Once funded, begin by creating guidelines and initiating discussions to help teachers identify the best uses of technology and avoid situations in which the technology becomes a distraction.

Next, teachers and administrators should have ample time with the new technology they will be using well before they are expected to implement it into their schools and classrooms. Educators must be comfortable employing it for their own personal use and professional growth before they can be comfortable using the technology to teach.

During this time, focus professional development sessions on technology integration, data-driven decision-making, and meaningful uses of technology in the curriculum, rather than on how-to lessons. Teachers, like students, should have opportunities to learn at their own levels and in their own style.

**During Implementation**

Offer opportunities for educators to get their how-to technology questions answered through just-in-time, technology-based modules and peer support. Online professional learning is cost-effective and expeditious. Professional learning that builds internal capacity rather than supporting episodic training events produces a tremendous return on investment. Use a similar approach for reinforcing crucial information covered in face-to-face sessions. For example, you might post a Q&A data-coach session online to direct teachers on how to use student data to track instructional planning, assessments, and student progress.

And, since every minute of class time is precious, provide teachers and student support teams with sufficient technical instruction, so they feel comfortable addressing minor connectivity interruptions in the classroom.
Ongoing

Professional development should be reinforced in a number of ways, rather than one-time workshops without any follow-up. Mentoring programs should be implemented, in which more experienced technology-using teachers support their colleagues.

Remember that professional development is an ongoing process. Prepare staff to see issues as challenges rather than obstacles, and offer encouragement for improvement. Educational opportunities should also be made available to parents, guardians, and all school personnel, if possible.

When teachers learn and grow together, the need for outside consultants disappears over time. Coaching, collaborating, and co-planning can be incorporated into a teacher’s daily or weekly schedule using creative scheduling. And high standards for teacher growth and a way to achieve those standards increase teacher productivity and the focus on instructional techniques.

Using data to monitor and shape instruction is essential to education today—not just in teaching students but also in designing effective professional development. One way to do this is by implementing a human capital management solution that allows your district to track teachers’ participation and progress in professional development offerings.

Applying a data-driven approach to professional development also allows you to monitor and improve the quality and consistency of teacher education over time.

Making Connections in a Connected World

In collaboration with various educational organizations, the Connected Online Communities of Practice project is working to increase the quality, accessibility, and connectedness of existing and emerging online communities of practice.

The nonprofit organization does this by launching and leading new online communities of practice. These online communities are run by collaborating organizations dedicated to the development, facilitation, and
evaluation of selected content and activities. In this way, the Connected Online Communities of Practice project develops ideas regarding new designs and infrastructure that could better support educators in making productive connections.

The 2010 National Education Technology Plan demonstrated the importance of educators becoming more connected to resources, tools, colleagues, experts, and learning activities, both in and beyond schools. Participation in online communities of practice is a key way educators connect. The Connected Online Communities of Practice project stewards a scalable, sustainable ecology of online communities to improve teacher and leader effectiveness, enhance student learning, and increase productivity.

**RESULTS**

Every successful education technology should not only end with great results, but also begin with those in mind. Specifying a program’s goals from day one and determining how progress will be measured is a crucial first step. Monitoring results every step of the way—stopping at various points to assess the overall impact of the initiative and determine necessary changes—is also vital to ensuring the success of a program.

This ongoing evaluation is not only vital to the success of individual programs, it helps other education leaders to learn from one another’s success and build new programs based on scientifically based research.

**CASE STUDIES**

**Profile: Forsyth County School District**

Forsyth County Schools (FCS), located north of Atlanta in Cumming, Georgia, serves roughly 39,000 students in grades Pre-K through 12. Its 36 schools, including a charter high school and 6-12 virtual school, constitute the largest employer in Forsyth County. In recent years, Forsyth County Schools in Georgia have created an acceptable use policy (AUP), updated their network infrastructure, and developed a BYOD initiative for all of the schools in the county. The Forsyth pilot program illuminates both pros and the cons of BYOD programs.

**THE GOAL**

The overriding goal was to use classroom technology to engage students in asking questions and choosing tools to facilitate real-world problem solving. Yet Forsyth wanted to let each school determine individual rules about how and when BYOD tools would be used. As a result, the program varies among schools, with school leaders deciding what works best for their individual goals and school culture.
THE CHALLENGE

BYOD requires much more than merely changing technology policies. It often means overhauling the curriculum and spending money training teachers to create a more personal and memorable learning experience. To meet their goal, FCS implemented a number of technology initiatives, including digital textbooks and education resources, interactive classroom technologies, and online education. The FCS technology services department was faced with supporting an increasing number of classrooms with new instructional technology uses and technology initiatives while keeping up with a tremendous growth rate. According to the technology services office, “It’s a constant struggle to maintain the standardization and consistency that is necessary to keep the total cost of ownership low while at the same time providing the needed flexibility so that the technology resources can be used to their maximum benefit.”

THE SOLUTION

To meet the growing network demands of student and staff devices, FCS upgraded its Internet access to ensure a robust network capable of handling large demands from student-owned devices. They also took measures to protect the network from viruses and other possible issues related to users bringing in their own devices.

To make the BYOD initiative a success, FCS provided comprehensive professional development on teaching and classroom management strategies to effectively incorporate mobile technology devices into daily curricular objectives. Initially, this training involved a core group of 40 teachers, from 7 schools in the district, representing a range of grade levels.

This district-wide commitment to collaboration and team-based support extended to parents and students as well. Communication with parents about the BYOD initiative is an ongoing priority, provided through presentations at school council and PTA meetings. The district explains, “Parents purchase devices to entertain their children. At school, the devices actually lead to more collaboration and discussion. We let parents know that our students are competing for jobs and education on a global scale, and they need to have more access to the necessary tools to be equipped to be successful now and in the future.”

THE RESULT

While the district has found that increasing technology in the classroom has come with some unexpected
strings attached, such as necessitating the training and hiring of teachers who are willing to play the role of facilitator and letting students lead their learning, they view their BYOD efforts, overall, as a rousing success. The district school board and local community are very supportive of instructional technology and have high expectations for its use. From the superintendent to individuals across departments and school levels, FCS educators are excited about the BYOD initiative. They state, “We also do not force anyone to implement BYOD, because we realize that every learning community needs a different amount of time to adopt the initiative. Also, we have school-based Instructional Technology Specialists and Media Specialists in every school to help model instruction with BYOD for teachers and to assist in developing new strategies for the use of devices.”

With this level of support, FCS hopes that its students will continue to excel in all areas through connected learning with each other and their devices.

Profile: Oak Hills Local School District

The Oak Hills Local School District (OHLSD) in western Hamilton County, Ohio, serves roughly 8,100 students in preschool through grade 12. Maintaining the county’s lowest per-student spend, the district nonetheless delivers a wide range of youth and adult services, including programs for gifted students, special education services, and vocational and community education.

THE GOAL

Above all, OHLSD wanted to reduce IT costs while delivering anytime, anywhere teaching and learning. The district decided to try a BYOD model because they believed that using technology in the classroom would help prepare their high school students for work in the 21st century world. In the planning process, the district decided
to take their BYOD program one step further by building a virtual desktop system that could be accessed through any device students or teachers bring into school.

THE CHALLENGE

Working closely with the community, an OHLSD team developed a “Vision for Technology and eLearning” plan that outlined their goals as well as the required action steps to bring their schools into the world of 21st century learning.

“It’s about being proactive and having a plan for the future, not just reacting to what you’ve done in the past,” said Janice Hunter, Oak Hills local board of education president. She also added, “Educational systems have to find ways to keep up with the changes in technology or they can’t fully educate their students.”

This vision, however, was not without its challenges. Like many schools, OHLSD was facing budget cutbacks and increased accountability for spending initiatives with long-term feasibility. Dave Kearns, instructional support administrator for the district, explains some of the challenges facing the district:

“Our schools operate on a five-year technology-refresh cycle, and we needed to retire some 850 aging and increasingly high-maintenance desktops and laptops at the high school. Unfortunately, this refresh cycle coincided with district-wide budget reductions of 10%. Although we retained a capital budget for the refresh, we needed a solution that would significantly reduce ongoing costs. At the same time, we had to build on a foundation that could accommodate long-term growth and support objectives for e-learning leadership.”

The district’s goal was to deliver anytime, anywhere learning to every Oak Hills high school student. But with reduced IT operating budgets, buying new laptops for each student was not an option. The district needed

Professional development is one of the most crucial—and frequently overlooked—aspects of implementing a technology initiative.
a solution that would maximize the number of devices, provide 24/7 access to learning, while also reducing ongoing costs and planning for future budget reductions.

THE SOLUTION

In the fall of 2010, Oak Hills implemented a Bring Your Own Device (BYOD) program and opened its high school to student devices. A strong network of IT professionals, teachers, and students working together to ensure success supported the initiative.

With this team in place, Oak Hills also required a strong network infrastructure to support the increased demands for bandwidth from student devices in the BYOD program. For Oak Hills, this network infrastructure also had to support a district-wide virtual desktop implementation. The network infrastructure was designed to be strong enough to handle the heavy demands that occur during peak access times, for example, at the beginning of classes when large numbers of students log in simultaneously. The IT team also budgeted for network growth, as new software applications demand an increasing amount of bandwidth. This need for future expansion was built into the existing network infrastructure.

When planning the BYOD initiative, the IT team recognized a significant challenge—how to provide software tools that can be used by all students on any device. This required considerable planning, and led to the team’s decision to create a private and public cloud. The private cloud sits on district-owned servers and essentially replicates a desktop experience for students. It is generally used by students who have specific software needs and do not have access to that software on their own device. The public cloud contains web-based applications that can be accessed through any Internet connection. Using web-based software allows a BYOD program to be device neutral.

A final consideration for the BYOD team was the creation of an acceptable use policy (AUP) to establish and communicate specific guidelines for using personal devices on campus. The AUP outlines where and when devices can be used, as well as policies for social networking and messaging.

THE RESULT

The availability of mobile devices for every student has proven to be invaluable for teachers working to incorporate 21st century learning and technology skills into their curriculum. With anytime, anywhere access, Oak Hills teachers have developed online companion sites for their classes. Some items featured on the companion sites include daily objectives, discussion forums, electronic textbooks and articles, course resources, a class calendar, and online assignments and assessments. Zach Vanderveen, Oak Hills eLearning coach and course developer, said the companion Web
sites have helped encourage student learning to continue outside school walls. “It’s wonderful not to have to stop the learning at the end of the school day,” Vanderveen said. “We see discussion and engagement go on after school as students continue to learn online.”

The supportive network infrastructure and virtual desktop application enables Oak Hills students and staff to access learning applications, data, and services 24/7 from any mobile device. “In the past,” says Kearns, “students had to work from the school’s media center or in classroom mobile labs with restricted access hours. Today, information is at their fingertips, any time, day or night. The infrastructure has changed the rules about when and where students can learn—it dramatically expands their opportunities to research, develop teamwork and problem-solving skills, and progress through a curriculum.”

In addition to student engagement and learning gains, the district also boasts a significant cost savings through the BYOD initiative. The savings from this infrastructure comes in many forms, including hardware, space, energy, and administrative efficiencies. Although the initial costs of network infrastructure were substantial, the district saves annually on costly computer purchases, repairs, and necessary upgrades. This is not only saving the district money, but also resulting in more current, reliable computing devices for students.

**GATHERING AND MANAGING DATA**

Ongoing technology-enabled data analysis can play an important role in monitoring results and refining approaches. The latest tools being used for such purposes are known as School Performance Management Systems (SPMS)—comprehensive systems that help foster data-driven decision-making at all levels of the school district.

Tennessee’s Knox County Schools is in the process of implementing such a data system. Their new SPMS will tie into current systems scattered throughout the district and, according to the district Web site, offer “snapshots in time,” allowing administrators, principals, and teachers to tailor education to specific student needs. The data can be analyzed in a variety of ways to determine the performance of a student, teacher or school, and identify factors contributing to failure or success.

By tying data to financial and budget information, administrators can also allocate dollars more effectively and gain a better understanding of the return on their investments. District leaders are also discussing future add-ons, such as *formative tracking*, which monitors a student’s learning progress throughout the school year rather than relying on end-of-course exams.

Implementing School Performance Management Systems involves educating all stakeholders about
data-driven decision-making and the specifics of using the new tools to access key performance indicators (KPIs) at the district, school, and classroom levels. This allows administrators and principals to provide an accurate and actionable picture of a district’s progress, deploy formative and summative benchmark testing, monitor professional development planning and effectiveness, and optimize instruction and staff productivity.

SEEING RED

Project RED: Revolutionizing Education is a national research and advocacy plan to investigate how technology can help us reengineer our education system. Since its inception in 2009, this initiative has used a cost-benefit analysis to determine which education technology programs and devices are having the most cost-effective impact on schools, parents, and states.

In 2010, Project RED conducted the first large-scale national study to identify and prioritize the factors that make some U.S. K-12 technology implementations perform dramatically better than others.

Examining 997 schools, representative of most U.S. schools, and 49 states and the District of Columbia, Project RED found that schools employing a one-to-one student-computer ratio and key implementation factors outperformed other schools, and revealed significant opportunities for improving education return on investment (ROI) by transforming teaching and learning.

An analysis of the Project RED data revealed major findings of interest to schools embarking on or already administering a technology implementation. Attention to these findings can help schools achieve a higher degree of success:

- Properly implemented technology saves money.
- One-to-one schools employing key implementation factors outperform all schools, including other one-to-one schools.
- The principal’s ability to lead change is critical. Change must be modeled and championed at the principal level.
- Online collaboration increases learning productivity and student engagement.
- Daily use of technology delivers the best return on investment (ROI).
Project RED has compiled a powerful resource showcasing the ways that technology can improve education in schools while reducing costs. The Positive Financial Impact of Technology-Transformed Schools is a downloadable e-book from Project RED. The research and insight included in the report are an extension of Project RED’s Roadmap for Transformation initiative, a movement dedicated to the belief that technology will transform learning, just as it has transformed most every other aspect of our lives. Topics covered in the booklet include the advantages of online formative assessments—both in terms of valuable real-time feedback and reduced cost—digital instruction materials—affordable, with the ability to see which resources are actually used, by whom, and when—the power of blended learning—with recent research showing that students prefer a blend of online and face-to-face instruction—and the need for continual professional development for teachers, and how online resources can provide such meaningful learning opportunities within a school’s budgetary constraints.

Each of these points is supported by real-world case studies. Irving Independent School District in Texas, for example, is using an ambitious online formative assessment program for English language arts, math, science, and social studies. Parks Middle School in Atlanta, Georgia, has seen a significant drop in police actions—from an average of three a day to three a year—after launching a one-to-one-laptop program. Vail, Arizona’s Empire High School was the first all-digital high school in America. While the cost of developing digital content was similar to the costs involved in aligning analog content with state and district standards, the Empire High School felt the benefits were far greater. And Walled Lake High School in Michigan managed to save money despite the state’s economic downturn by integrating online coursework, showing a savings of $900 per student, to $383.

As K–12 education expenditures have increased while overall student engagement and achievement seems to be on the wane, the facts, figures, and real-world solutions included in The Positive Financial Impact of Technology-Transformed Schools could have a significant impact on the reengineering of our educational systems. The e-book is available for download at www.iste.org/learn/publications/books/projectred.