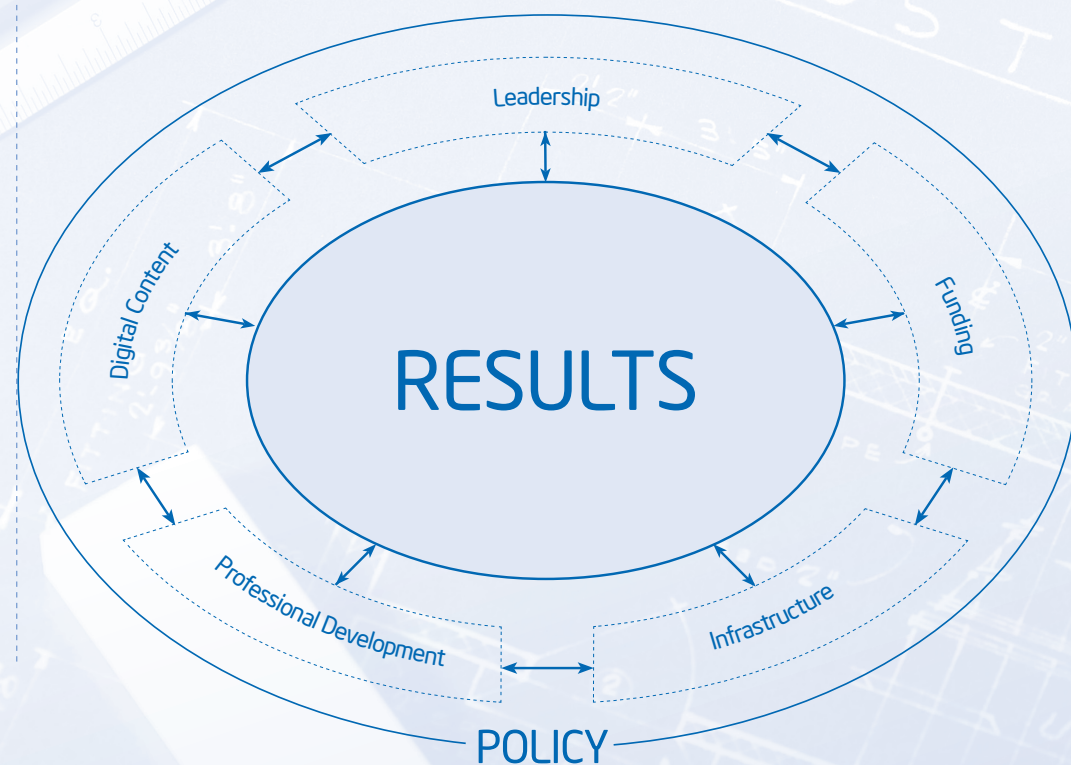# The K-12 Computing Blueprint

for eLearning Initiatives

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

Leadership

Digital Content

Funding

RESULTS

Professional Development

Infrastructure

POLICY

Inside:

Definition:
n. **one-to-one computing —** each teacher and student has access to a computer, the Internet and software anytime and anywhere.

www.k12blueprint.com

(intel)

1 INTRODUCTION

Technology has a crucial role to play in preparing young people for success in the 21st century, but such success requires a lot more than simply placing the right tools in students' hands. In the pages that follow, we offer a blueprint for building effective and ambitious technology initiatives — ones that are based on real-world successes and that take into account the complex array of variables that impact schools today. These include:

Policy: Shown as the outer ring on the diagram on the cover; 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 a state-level initiative designed to address issues of greatest concern to citizens and politicians, or working with your local community to build acceptable use policies that encourage learning while keeping students safe, understanding the elements of effective policy-making is crucial to school leaders today.

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

Funding: Foremost on the list of concerns for many education leaders today, funding to implement visionary programs is an important challenge to be addressed. This involves identifying sources of initial funding, having an intimate understanding of TCO (total cost of ownership) and VOI (value of investment),

and tapping into the efficiencies and cost-savings made possible by technology implementation.

Digital Content: Central to 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 vision for the ways in which curriculum, content and instruction need to evolve in order to educate students for their future are all essential.

Infrastructure: Although an effective education technology initiative should not start with the bits and bytes — but, rather, with the needs the technology is meant to address — making wise decisions about the hardware and software to be used and building the IT infrastructure to support reliability and ease of use are vital to the success of a technology-based program.

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 are two key elements of a successful professional development program.

Results: As shown clearly on the diagram, 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 learn along the way are all central elements in building an effective technology-empowered initiative.

2 POLICY

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

A key aspect of effective policy is that it is flexible, frequently evaluated, and modified as needed to engender true transformation. A systematic approach to policy formulation will enable policy-makers to establish realistic policies in reasonable time frames. Central to the process is focusing on clear goals and putting in place 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, it is essential for policy-makers to be aware of the fairness and equity of the policy to all parties it impacts.

Technology has a crucial role to play in preparing young people for success in the 21st century, but such success requires a lot more than simply placing the right tools in students' hands.

Participation in public education policy-setting by educators and community members is on the rise at the federal, state and local levels and there are countless avenues for such participation. 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 within 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 [as 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."

GETTING INVOLVED

Educators and other stakeholders can get involved in educational policy either as individuals or as members of an advocacy group or association. 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 get successfully involved in educational policy include:
- Public opinion surveys and polling (surveys are a great way to discover support strategies for your initiative);
- Direct mail and media announcements;
- Partnering with community organizations to support policy that benefits both school and community;
- Working closely with local press;
- Developing fundraising 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 often tell your story in a way that administrators might never think of;
- Recruiting students for decision-making positions (a number of states have enacted legislation providing for student members of the local school board so the student voice has greater representation in the formation of educational policy);
- Getting to know the chief of staff for your mayor and other government officials;
- Visiting your state congressional or assembly representatives and education policy advisors;
- Using digital media to get the word out about school programs and plans;
- Participating in public meetings.

While many policy decisions are made at a 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 "do's 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.

Sample State Legislation: Texas HB 4294

In June 2009, the governor of Texas signed House Bill 4294 into law authorizing the commissioner of education to adopt a list of electronic textbooks and instructional materials for school districts to choose from in addition to the state-adopted textbooks. Previously, public schools were required to use their state textbook allotments to purchase hard-copy textbooks for all of their students. HB 4294, which was developed with widespread input from stakeholders throughout the state, allows local districts to decide for themselves how much of their state textbook allotment to use towards digital materials, offering them a choice with regard to the technologies and instructional materials they purchase. Through provisions of the bill, the state textbook fund may be used to purchase technological equipment necessary to support the use of electronic textbooks or digital instructional material included on the adopted list. For more information, visit http://www.legis.state.tx.us/BillLookup/History.aspx?LegSess=81R&Bill=HB4294.

Proposed State Initiative: New York's 21st Century Education Act

A bill to create the 21st Century Education Act is currently being considered in the state of New York. Proposed Bill A05686 would direct the State Education Department to establish a pilot program that maximizes the use of technology in the classroom to meet the state's education standards. This pilot program would involve the integration of wireless technology into 45 selected seventh, eighth and ninth grade classrooms across New York State. All students and teachers would be given access to laptop computers with wireless capability as well as technical support and training on how to utilize the technology to help students attain the State Learning Standards. Participating classes will be chosen by the Department based on applications submitted by interested school districts. Applicants would submit proposals on how they plan to utilize the technology as well as partner with local businesses and civic groups to maximize the benefits of the pilot program. The Education Department would conduct a study of the program for the purpose of assessing the benefits of technology in helping to educate children. For more information, visit http://assembly.state.ny.us/leg/?bn=A05686.

Economic Policy in Multiple States: Sales Tax Holidays for Computers

Many states in the U.S. have instituted an annual sales tax holiday in recent years with the goal of saving consumers money and spurring sales on designated items. Popular with shoppers and retailers alike, these sales tax holidays last for a few days and offer an opportunity for policy-makers to support products and industries that they see as important to their state and their citizens. In recent years, for example, a number of states have encouraged energy efficiency by making Energy-Star compliant items exempt from sales tax during the holiday period. Frequently the sales tax holiday takes place in August and applies to back-to-school supplies. In several states — including Alabama, Georgia, Missouri, New Mexico, North Carolina, South Carolina and Tennessee — the sales taxes have also been dropped on computers and accompanying supplies during the sales tax holiday. For education leaders committed to the use of technology in education, advocating for a sales tax holiday on laptop computers and other technology-based school supplies makes a lot of sense — saving families money, helping businesses thrive and preparing students for the 21st century. For more information, visit http://www.taxadmin.org/fta/rate/sales_holiday.html.

The Argument for Sales Tax Holidays for Computers	
Challenge	**Equip students with tools for today – and tomorrow:** 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 cause problems since they are often saddled with maintenance problems and downtime and are far less energy efficient or portable than today's new models.
Solution	**Make new PCs more affordable in today's difficult economy:** 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 the time that families are concerned about mounting debt and saving for college.
Impact	**Students prepared:** Learners outfitted with laptops will be better equipped for today's classroom and tomorrow's work-place. They're 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 them aside for future needs. In this tight economy, every little bit helps. **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.

③ LEADERSHIP

Look closely at the research about effective technology implementations and there is one element that almost invariably emerges: inspirational and supportive leadership. School and district-level leaders frequently hold the key to the success or failure of a local program, while inspirational leadership by state and federal policy-makers can help change the culture of learning throughout the entire country.

Research results from the Texas Technology Immersion Pilot (TIP) offer an example of how this works. In evaluating year three of the TIP program, which placed laptop computers in classrooms at 21 middle schools for one-to-one use, researchers found that "students who attend schools that keep laptops in students' hands and encourage the use of laptops at school and at home for academic pursuits, earn higher test scores" and that "the effects of technology immersion on reading and mathematics achievement generally become stronger over time as teachers and students become more accomplished technology users." Unfortunately, the majority of the schools participating in the program did not reach the levels of "classroom immersion" that tend to make such gains likely. One of the factors that most significantly impacted classroom immersion was 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." For more information, visit http://www.etxtip.info/images/y3_etxtip_quan.pdf.

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.

The education division of SIIA (the Software & Information Industry Association) has developed a toolkit that offers suggestions to school leaders about the planning process involved in implementing a new program. Suggested steps include:
1. Determine the program's objectives before planning proceeds.
2. Involve all program stakeholders in the planning process.
3. Include criteria for evaluating the program's success in alignment with the program's objectives.
4. Assign an effective leader, with appropriate decision-making authority, to manage the implementation.

Effective leaders are ones 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 but who also 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. Here are some steps to help implement a far-reaching, 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;
- Include not only local perspectives but also encourage participation by state-level policy-makers;
- Enlist the support of all key players who will play crucial roles in the development of the initiative;
- Define short and long-term goals for the initiative that demonstrate to stakeholders how it will improve the quality and effectiveness of teaching and increase student achievement.

Develop Teacher Buy-in:
Since teachers are key to systemic change in the classroom, it is essential to involve the professional teaching staff within each school in the development phase of any new initiative. By allowing for teacher input and giving the teachers a voice in the decision-making process, the result will be a collaborative adoption of a shared vision rather than an ill-received directive. 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:
- Develop objectives for students, teachers and administrators;
- Align these with district technology and content standards;
- Determine how the program will be evaluated — how you will measure success;
- Determine procurement policies for the initiative;
- Consider long-term funding and how to sustain the initiative over time;
- Create policy documents to guide the process and educate the participants;
- 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:

- Do a gap analysis of all four elements;
- Research and learn from the experiences of others;
- Forecast technical infrastructure needs, with an eye to increasing capacity over time;
- Consider beginning with a smaller-scale pilot implementation or use a phased approach;
- Seek vendor expertise and partnerships to estimate project cost;
- Know why you are implementing the technology initiative and know what success looks like.

Maximize Communication:

- Establish a task force focused on communication;
- Use 21st-century technology tools (eg., e-mail, Web sites, online user groups, wikis and collaborative documents, blogs) to support the planning and collaboration process;
- Continue communication with milestone reports to keep stakeholders informed of major progress;
- Inform people to be able to understand what is changing, when the change will occur and the successful impact the implementation would ultimately have.

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 mission-critical;
- While broad representation is important, it is wise to limit the actual number of people on your task force;
- 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 develop them as situational leaders to foster and support change among their colleagues.

In the end, effective leadership helps ensure that technology-based initiatives are targeted and effective. All of the following are key actions to take:

TALK...Hold special briefings for key stakeholders, detailing project progress. Share written information and data collected with peers and other stakeholders.

PLAN...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 flow chart outlining channels of communication.

TRAIN...What additional skill sets do the new equipment and data-driven decision-making solutions require? Provide training for all skill levels.

LEARN...Study the successes and failures of others. Be open to large and small-scale technology implementation ideas and solutions that other types of businesses use.

SAMPLE OBJECTIVES FOR A ONE-TO-ONE INITIATIVE:

Teacher Objectives:
- Utilize data-driven decision-making performance solutions;
- Improve technology skills;
- Enhance teacher proficiency and effectiveness;
- Align curriculum, assessments and instruction with standards;
- Develop a repository of content-neutral supplemental teaching materials, item banks and content;
- Individualize and accelerate student learning;
- Monitor progress and differentiate instruction via easy-access classroom dashboards to real-time performance and diagnostic data;
- Deploy classroom assessments to track students' mastery of skills and standards and adjust instruction to impact progress;
- Involve parents through Web-based communication, collaboration tools and parental outreach programs;
- Increase 21st-century job skills.

Student Objectives:
- Extend access 24/7 for school and home use;
- Revitalize student interest;
- Improve technology skills;
- Improve communication and collaboration with peers;
- Reduce absenteeism and dropout rate;
- Narrow achievement gaps.

Administrative Objectives:
- Evaluate results from classrooms and stakeholders on an ongoing basis;
- Provide professional development to meet the needs of faculty, staff and student body;
- Develop a curriculum that will maximize the learning potential of all students;
- Provide the tools necessary for teachers to teach to their highest capabilities;
- Provide students with the skill sets needed for success in the 21st century.

EVALUATE...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.

ALLOW TIME...Informed and gradual change is easier to accept and implement. Allow adequate time for those involved to communicate questions and concerns, and to make adjustments and suggestions that strengthen the mission and ensure success.

USING SOCIAL MEDIA

Effective communication is a central component of effective leadership. School leaders in a number of 21st-century programs are using social media to communicate with families and other community members. Some examples:

- *The Urban School of San Francisco* utilizes Facebook and Twitter to update its parents and students on its one-to-one laptop program and other school news and announcements:
  Facebook: *http://www.facebook.com/pages/San-Francisco-CA/The-Urban-School-of-San-Francisco/83680743483*
  Twitter: *http://twitter.com/urbanschool*

- *The Superintendent at Kershaw County School District in Camden, South Carolina*, keeps a blog with information about district projects, including its i-CAN Laptop Technology Initiative:
  http://www.kershaw.k12.sc.us/media/

- *The Maine Learning Technology Initiative* has program-specific RSS feeds available to the public: *http://maine.gov/mlti/rss-feeds.shtml*

④ FUNDING

In planning for a new technology or expanding an existing one, there are two aspects of budgeting to be considered: the initial costs and ongoing funding to support the program over time.

INITIAL INVESTMENT

There is little doubt that launching a one-to-one laptop program or other major technology initiative requires initial funding that goes beyond the usual cost of equipping classrooms for a new school year. Fortunately, these initial costs can often be covered by special-purpose funding such as:

Foundation Grants: There are numerous foundation grants available to school districts or school sites that apply for them. Millions of dollars are available — some of which is given on a one-time basis, while other grants are renewable on an annual basis depending on the results of the implementation. There are many foundations in the private sector that allocate funds to schools willing to take the steps to bring in innovative learning environments that will develop students to be 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 have been confident about the positive effects such measures can have for students and the economy.

Statewide Pilots and Seed Funding: Although recent financial woes have made it difficult for many states to launch new technology initiatives, some states are continuing to support ambitious 21st-century initiatives. One example is the state of Maine, whose pioneering one-to-one middle school laptop program, the Maine Learning Technology Initiative

(www.maine.gov/mlti), has recently begun expanding to high schools. The funding is more limited than that available to the middle schools that were involved in phase one of the program but the state has been involved in negotiating affordable lease prices and providing infrastructure and professional development.

It is worth noting that the adoption of a 21st-century learning environment — and all of the tools it entails — is not solely a capital investment. While it may seem like bringing in a huge quantity of computers and software applications 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.

METHODS FOR ACQUIRING COMPUTER DEVICES

Purchase: This is most beneficial when ongoing funding is uncertain. However, this approach does not easily allow for upgrades or replacement strategies.

Lease Program: Leasing machines for two to five years spreads costs over time and makes it easy to upgrade to new equipment as it becomes available and necessary.

Lease/Purchase: Some installment financing is available and some hardware companies support upgrades over the life of the lease.

Individual/Family Purchase: Cost-effective rates can be negotiated for an entire district or state, with foundations or other organizations offering assistance to those who need it.

ONGOING COSTS AND COST SAVINGS

When considering a one-to-one implementation or other major technology initiative, schools must 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 involved in 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 can often receive 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 that place volunteers in the schools to provide technical support and education to students and teachers are two examples of ways that local organizations can help schools while reaping both tax and PR 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 parts 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, it is important to look for the ways in which the innovative use of technology can actually save a district money. The long-term effects of one-to-one adoption, for example, can bring many parts of an annual budget down after year one. 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, communications costs can be drastically reduced as schools begin corresponding with families through the one-to-one technology in use by their children.

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 the "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. 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**.

TCO and VOI Tools from CoSN

The Consortium for School Networking (CoSN) offers valuable tools for measuring Total Cost of Ownership (www.classroomtco.org) and Value of Investment (www.edtechvoi.org) — both important to consider before embarking on a new project. TCO looks at the installed (and optionally the planned) computer environment costs, while VOI looks at the anticipated benefits as well as the costs of technology projects. As the CoSN VOI site puts it, "Benefits include any dollar savings, efficiencies or additional revenue generation, but also need to take into account qualitative benefits that relate directly to school mission, goals and mandates."

5 DIGITAL CONTENT

TRANSFORMING CLASSROOMS WITH HELP FROM TECHNOLOGY

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.

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 different languages;
- Be reformatted for presentation and dissemination in various ways;
- Include graphic, video, virtual reality, animations, simulations, audio, music, interactive and gaming elements;
- Engage students through a rich and varied array of intelligences.

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;
- Publishing for a genuine audience;
- Writing and editing using a variety of tools;
- Collaborating locally and globally.

Sample District Implementation: Carmel Middle School in Colorado Springs, Colorado

During the 2008-2009 school year, Carmel Middle School in Colorado Springs implemented its 21s Century Curriculum Program. Offered to 200 sixth, seventh, eighth and ninth grade students throughout the Harrison School District, this program's goals are to support: critical thinking and reasoning; information literacy; economics and globalization; constructing knowledge through technology experiences in the "global" classroom; math and science reasoning; foreign language learning; and the exploration of 21st-century arts. Central to the implementation are laptop computers, field trips, hands-on projects and a commitment by students and families to attend after-school and weekend education events. For more information, visit http://www.harrison.k12.co.us/communications/pilotprograminfo.shtml.

Sample State Initiative: California's Free Digital Textbook Initiative

In May 2009, California Governor Arnold Schwarzenegger highlighted his digital textbooks initiative at a local high school. This "first-in-the-nation" initiative was introduced as a way to provide schools and students a new way to access textbooks that are less expensive, easier and lighter. The first phase, which took place in the summer of 2009, involved the review of free digital high school math and science content by a state panel that made recommendations to schools. Additional content will be solicited and evaluated in the years to come with plans to create a statewide Web site highlighting available digital textbooks. According to the governor's office, this initiative has the potential to save California's schools millions of dollars. For more information, visit http://gov.ca.gov/index.php?/fact-sheet/12455/ or http://www.clrn.org/fdti/FDTI_Report.pdf

6 INFRASTRUCTURE

In implementing a one-to-one initiative or other technology-intensive programs, district leaders must take into consideration 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 (is this a one-to-one program or will it be sufficient to have computers shared through mobile carts?), 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 to allow for pen input and make it easy to annotate text and mathematical or graphical content. Still others have included ultra-light computing devices such as Intel-powered classmate PCs, geared to younger users, or other lightweight, inexpensive "netbooks."

The ideal mobile computing device for school use:
- Is both lightweight and sturdy;
- Is provided to students in a protective carrying case;
- Has several hours of battery power and easy options for recharging;
- Has wireless capabilities and appropriate software;
- Offers sufficient storage;
- Is flexible, with USB ports and other options for expansion.

In selecting such devices, a school should consider:
- Exploring the pros and cons of tablet PCs vs. standard laptop technologies;
- Implementing a battery exchange plan;
- Providing written usage guidelines and establishing security measures;
- Providing onsite 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 and make it easy for them to transmit and collect assignments wirelessly;
- Buying the best machines you can afford.

THE NETWORK

Just as important as the computing devices in use by students and teachers is the network that supports these devices. It must be:
- Stable, secure and reliable, inspiring trust on the part of users;
- Able to perform daily operations smoothly and effectively even with a large number of simultaneous users;
- Supported with ongoing professional development and maintenance;
- Easily scalable to allow for future growth — including the ability to accommodate additional computers, servers and peripherals.

Additional suggestions for building an effective network include:
- Perform stress tests on the system to make sure that it can support a sufficient number of simultaneous users;
- Test wireless signals in multiple settings and conditions;
- Negotiate effective software licensing agreements and adhere to them.

In addition to wireless access within their schools, districts need to consider what sort of access they are providing to students when they are at home or in other parts of the community. Ubiquitous computing involves anytime, anywhere, anyway access — the ability to access educational resources wherever and whenever they are needed. For the ultimate in 24/7 computing many communities are turning to WiMAX. Faster than WiFi and with a much greater range, WiMAX behaves somewhat like cellular phone or data networks, offering wide coverage throughout a community, facilitated by careful placement of tall outdoor antennas. To learn more about WiMAX in education, visit: http://www.k12blueprint.com/k12/blueprint/cd/Intel_WiMAX.pdf

Consider This:

$$\left(\begin{array}{c}\textbf{Mobile Teacher and}\\\textbf{Student Platforms}\end{array}\right) + \left(\begin{array}{c}\textbf{Robust}\\\textbf{Connectivity}\end{array}\right) + \left(\begin{array}{c}\textbf{Rich Digital}\\\textbf{Content}\end{array}\right) = \left(\begin{array}{c}\textbf{Anywhere, Anytime,}\\\textbf{Anyway Learning}\end{array}\right)$$

With the right infrastructure, schools can:
- Offer anytime, anywhere, anyway 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;
- Develop partnerships both locally and globally.

SUPPORT

Beyond purchasing equipment and installing the network infrastructure, IT leaders need to be prepared 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 be sure that needs are being met.
- Utilize students to help maintain equipment and support users. This approach challenges advanced students while reducing the load on IT staff.

(7) PROFESSIONAL DEVELOPMENT

Professional development is one of the most crucial – and 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.

Suggestions for building an effective professional development program to support your one-to-one program or other technology initiatives include:

- Provide teachers and administrators with the technology one year prior to implementing with students; before they can be comfortable using the technology to teach, educators must be comfortable employing it for their own personal use and professional growth.
- 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.
- Offer opportunities for educators to get their how-to technology questions answered through just-in-time, technology-based modules and peer support.
- 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.
- Professional development should be ongoing and reinforced in a number of different ways, rather than one-time workshops without any follow-up.
- Implement mentoring programs in which more experienced technology-using teachers support their colleagues.
- Since every minute of class time is precious, provide teachers – and student support teams – with sufficient technical instruction so that they feel comfortable addressing minor interruptions of connectivity in the classroom.
- Create guidelines and initiate discussions to help teachers identify the best uses of technology and avoid situations in which the technology becomes a distraction.
- Teachers, like students, should have opportunities to learn at their own levels and in their own style.
- Remember that professional development is an ongoing process. Prepare staff to see issues as challenges rather than obstacles, and offer encouragement for improvement.

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.

Proposed Federal Program: Preparing Teachers for Digital Age Learners

The Preparing Tomorrow's Teachers to Use Technology (PT3) program — a federal pre-service grant program that provided more than 400 grants to schools of education during its five years of operation — is credited with having a significant impact on improving teacher education programs and bringing them into the 21st century. In reauthorizing the Higher Education Act in 2008, lawmakers proposed a successor to PT3: Preparing Teachers for Digital Age Learners (PTDAL). The PTDAL program would award three-year grants to colleges of education to ensure they are equipping pre-service teachers with the skills needed to integrate technology effectively into K-12 classrooms. Although President Obama's proposed FY2010 budget did not provide funding for this program and the bill never became law, a number of organizations are urging Congress to reintroduce it. To learn more, see: **http://www.govtrack.us/congress/bill.xpd?bill=h110-5848**

⑧ RESULTS

Results provide the starting and ending point for any initiative. Specifying a program's goals from day one and determining how progress will be measured is an important first step. Ongoing monitoring of results is key, as is stopping at various points along the way to take a look at the overall impact of the initiative and determine any changes that are required as a result.

Not only is this sort of evaluation crucial to the success of individual programs, it helps education leaders in other parts of the country and the world learn from one another's success and build new programs based on scientifically-based research. To stay on top of the research around ubiquitous computing, visit K12 Computing Blueprint's Research Watch page at: http://www.k12blueprint.com/k12/blueprint/research_watch.php

STATE INITIATIVES

A number of states around the country have launched initiatives aimed at bringing one-to-one computing to students statewide. Whether the program was designed to ramp up quickly (like Maine's MLTI initiative, which extended laptops to all students in grades seven and eight) or focused on a more limited number of pilot sites (like the Texas TIP research program which involved 21 implementation and 21 control schools), program evaluation was an integral part of these statewide initiatives from day one.

Michigan's Freedom to Learn (FTL) initiative, implemented from 2003 to 2007, provides one example. A key component of FTL was a three-year rigorous and comprehensive evaluation study, conducted

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by the Center for Research and Educational Policy (CREP) at the University of Memphis, to measure progress towards the program's goals. Conclusions from the CREP report included:

- There were significant instances of FTL students outperforming non-FTL students on the state's math and reading tests and evidence that FTL students had developed key skills and knowledge needed for the 21st-century workforce.
- Freedom to Learn teachers and students widely agreed that laptops had a positive impact on student motivation, learning and achievement.
- Teachers reported greater confidence in their ability to effectively integrate technology into instruction and an increased readiness to do so as a result of professional development efforts that were key to the program.
- FTL served as a catalyst for innovative technology interventions that remained consistent in yielding improved educational opportunities for Michigan's students.

Although FTL is no longer funded by the state, the research findings and lessons learned from the five-year initiative are being applied in Michigan districts that have chosen to continue their own one-to-one programs as well as in other regions of the country that are tapping into the expertise of the One-to-One Institute (www.one-to-oneinstitute.org), which grew out of the Freedom to Learn program.

Research results from other state initiatives can be found at:

The Maine Learning Technology Initiative
http://www.maine.gov/mlti/index.shtml

Texas TIP Program
http://www.txtip.info/

South Dakota's Classroom Connections Program
http://www.classroomconnections.k12.sd.us/

DISTRICT PROGRAMS

Program evaluation and professional research are a part of a number of district-based initiatives as well. In Kent, Washington, for example, an ambitious one-to-one initiative that now involves all seventh graders, with other grades being added, began with a single "proof of concept" program. Kent Technology Academy (KTA), housed in the Mill Creek Middle School, opened in the fall of 2005 with ninety seventh graders and three teachers.

Research was conducted at KTA during year two of the program and results published by Dr. Karen Banks of Data Detectives (http://www.kent.k12.wa.us/ksd/it/one2one/documents/kta_final_report.pdf).

The findings included:

- The students participating in the pilot represented the diverse population of the district as a whole and the positive results, across the board, indicated that the one-to-one approach worked for a diverse group of learners.
- The program attracted students to Mill Creek with interest in the program exceeding availability.
- Achievement of KTA students on state exams (WASL) exceeded the performance of the overall district and of the state as a whole.
- Students in KTA (and in some other Mill Creek classes using technology) were highly engaged in their school work – excited about their projects and the strong support from their teachers. They reported that they worked harder and more efficiently because of the technology.
- KTA teachers received a great deal of training – with an emphasis on pedagogical best practices, not just technology use – and they reported that this training was useful in implementing the approaches used in KTA.

The research also identified opportunities for improvement. For example:

- Technology glitches caused some implementation problems with participants feeling that hardware vendors were "not offering products that would meet the optimal needs of KTA."

- Many of the students reported feeling stressed by the high expectations placed on them – including the work that they were expected to complete at home using their laptops.
- Challenges arose when students or faculty members left the program and routines needed to be established for incorporating new students and training new teachers.

As the Kent one-to-one program expanded to involve additional students and schools, careful attention was paid to the lessons learned in the initial years. "Much has been learned from KTA about the practical aspects of putting laptops in the hands of middle school students," said the Data Detectives research report. "For example, the types of hardware and software needed, costs in terms of central personnel and support, how to structure tech support, types of training teachers need, how to address security issues, and the physical needs (building, space, furniture) of such an initiative."

KTA and the Kent-Meridian Technology Academy (KMTA) – a ninth grade program which opened in year three as the original seventh graders reached high school – continue to function as "proof of concept" schools, allowing the district to try out new technologies and approaches before disseminating them more widely. To learn more, visit: **http://www.kent.k12. wa.us/ksd/it/one2one/success.html**

Research results from some other local one-to-one initiatives can be found at:

Irving, Texas
http://www.irvingisd.net/one2one/main.htm

Lemon Grove, California
http://www.lgsd.k12.ca.us/lemonlink/About.htm

Auburn, Alabama
http://www.k12blueprint.com/k12/blueprint/story_1on1_in_auburn_alabama.php

Henrico, Virginia
http://www.k12blueprint.com/k12/blueprint/research_watch.php

GATHERING AND MANAGING DATA

In addition to research projects with prescribed goals and a finite time frame, 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.

The Knox County Schools, in Tennessee, 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, a teacher or a particular school and what factors might be contributing to failure or success.

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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. Once this is done, administrators, principals and teachers will all have the necessary resources to:

- Provide an accurate and actionable picture of a district's progress;
- Deploy formative and summative benchmark testing;
- Track and monitor student progress and mastery of skills, then adjust and individualize instruction;
- Manage standard-based curriculum and individual instructional plans;
- Use and share standards-based resources and an online repository of third-party teaching materials and assessment items in an open, content-neutral and SIF-certified platform;
- Utilize compelling, insightful reports on student proficiency;
- Monitor professional development planning and effectiveness;
- Optimize instruction and staff productivity.

IN THE WORKS

iPods in NC's Chapel Hill-Carrboro School District

The Chapel Hill-Carrboro School District in North Carolina is one of many districts exploring the pros and cons of placing iPods, "smart phones" and other handheld devices in the hands of students. Working in conjunction with the North Carolina Virtual Public Schools (NCVPS), the district has been piloting the use of the iPod Touch in two schools: Culbreth Middle School and Scroggs Elementary School.

The iPod Touch will be used by students as a one-to-one device to access the Internet, view educational podcasts, download e-books and access other software. Students will create blogs, record audio and video podcasts and participate in lessons in virtual worlds. In the middle school, the pilot will run within a program called Advancement via Individual Determination (AVID). It places academically average students in advanced classes and gives them support to succeed in those classes and go to college.

NCVPS is working with the staff at both schools to design the courses and teaching tools and analyze results. The initial pilot gave each school $30,000 to buy audio/video equipment and mobile technology devices including the iPod Touch. The amount granted to each school may grow based on early study results, with the potential of becoming a statewide initiative.

"What we're doing is very purposeful research," said Bryan Setser, executive director of NCVPS. "It's really a national benchmark in terms of e-learning." To learn more, visit **http://www2.chccs. k12.nc.us or http://culbrethvideos.blogspot.com/2008/10/ipod-touch-culbreth.html**.

Project RED

The Project RED initiative was announced at the National Education Computing Conference (NECC) in July 2009. This initiative will examine the outcomes of educational technology initiatives using a cost-benefit analysis to determine which education technology programs and devices are having the most cost-effective impact for schools, parents and states. The Project RED team will research approximately 3,000 K-12 technology-rich schools. A model for other schools will be created once the characteristics of technology use to transform learning have been analyzed. These schools will also be evaluated in order to determine what cost savings schools realize when they use technology as part of their everyday teaching and learning. According to Leslie Wilson, President of One-to-One Institute, "The Project Team has the ability to make a national impact — to revolutionize the way we look at technology — not as a cost, but as a way to personalize learning and to change the way our students learn by making technology-assisted learning among recognized best practices, rather than an exception. Our basic premise is that technology holds the promise of allowing us to re-engineer our educational system. We can hold on to what is important, but the methods of achievement can be transformed through the use of technology, just as has occurred in almost every other segment of our society."

Project RED has been recognized by a number of national education associations, including the National School Boards Association (NSBA), American Association of School Administrators (AASA), Consortium for School Networking (CoSN), State Educational Technology Directors Association (SETDA), International Society for Technology in Education (ISTE) and Software Information Industries Association (SIIA). For more information, visit http://www.projectred.org/.

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