Born in Another Time

Ensuring Educational Technology Meets the Needs of Students Today — and Tomorrow

The Report of the NASBE Study Group on the Role of Technology in Schools and Communities
December 2012

The Report of the NASBE Study Group on the Role of Technology in Schools and Communities
Study Group Membership
(all are members of state boards of education unless otherwise indicated)

Nancy Perkins, Chair (ME)
Leslie Castle (UT)
Craig Coleman (UT)
Lynda Doyle (ME)
Vinni Hall (IL)
Donna Johnson (DE), Board Executive Director
Lowell Johnson (WV)
Lanita Koster (IL)
Dana Mann-Tavegia (WY)
Kenneth Mason (GA)
Sean-Marie Oller (VT)
Paul Pineda (GU)
Mat Santos (RI)
Angelika Schroeder (CO)
Winsome Sears (VA)
John Sieler (NE)
Madhu Sidhu (MD)
Russ Still (MO)
William White (WV)

Ex Officio Members

Peggy M. Siegel, Education Free Agent, Consultant
Bryan Bleil, VP, Online and Technology Implementation, Pearson

NASBE Staff

Whitney Meagher, Project Director
Elizabeth Ross, Interim Project Director
Chris Sun, Senior Project Associate

Also Assisting:

David Kysilko, Director of Publications
Steve Berlin, Senior Communications Manager
Kimberly Charis, Project Associate

Presenters to the Study Group

January 2012 Meeting

Bob Wise, President, Alliance for Excellent Education
Frank Gallagher, Executive Director, Cable in the Classroom
Helen Morris, Vice Chair, Alexandria, Virginia School Board
Julie Wray, Coordinator of Instructional Technology, Howard County Public Schools, Maryland
Brandon Honza, Teacher, Fulton Elementary/Clemens Crossing Elementary, Howard County Public Schools, Maryland
Lynne Schrum, Professor, College of Education, George Mason University

March 2012 Meeting

Richard Culatta, Deputy Director Office of Educational Technology, U.S. Department of Education
Noelle Ellerson, Assistant Director, Policy Analysis and Advocacy, American Association of School Administrators
Bob Farrace, Senior Director for Communications and Development, National Association of Secondary School Principals
Patrick Ledesma, Fairfax County Public Schools, National Board Certified Teacher and U.S. Department of Education Teacher Ambassador
Cory Linton, Vice President, School Improvement Network
David Byer, Senior Manager, Education Leadership and Policy, Apple Inc.
Emily Esch, Director of Education Marketing, Common Sense Media
Mike Lorion, Education General Manager, Common Sense Media

June 2012 Meeting

David Teeter, Director of Policy, International Association for K-12 Online Learning (iNACOL)
Doug Levin, Executive Director, State Educational Technology Directors Association (SETDA)

NASBE would like to thank Pearson Education for its support of the Study Group on the Role of Technology in Schools and Communities. However, the recommendations and substance of this report reflect the collective thinking of the Study Group members and do not necessarily represent the views of Pearson Education.
Contents

Summary and Recommendations .............................................. 5

1. Addressing the Voice and Needs of Today’s Students ........... 12

2. Ensuring Educators Can Use Technology in Meeting the Needs of Today’s Students .............................................. 23

3. Educational Technology Infrastructure: Preparing for the Technology of the Future .............................................. 37

Glossary .............................................................................. 48

Endnotes .............................................................................. 51
Summary and Recommendations

“Do not confine your children to your own learning, for they were born in another time.”

—Hebrew Proverb

Innovative technologies—from smartphones and smart TVs to iPads and even Leap Pads for preschoolers—have launched our children into a digital age, a period in which the average teenager texts 60 times every day, a large majority of teens have a social networking site, and the combined use of media by students averages 6.5 to nearly 10 hours daily, much of it in a multi-tasking environment. This generation of students truly has been born in a time very different from that of their parents, school board members, principals, and most of their teachers.

For educators and policymakers, one of the keys for effectively responding to this generation is remembering that educational technology is both a tool and a game changer. As digital influences expand and their effects on students’ lives increases, some of students’ fundamental educational experiences change as well. And as is true of any transformative era, this changing world that includes instant communication and access to information, open source instructional materials, personalized learning plans, and online learning provides both abundant opportunities and challenges to teachers and administrators. It also presents challenges to state boards of education, whose policy decisions made for a digital environment will deeply affect teaching and learning and impact more than simply what happens in school buildings.

To address these challenges, NASBE’s Board of Directors charged the 2012 Study Group on the Role of Technology in Schools and Communities with examining how our digital age has affected the learning needs of today’s students, and how state boards can ensure that their schools are fully prepared to address the impact of rapid technological change on the fundamental processes of teaching and learning. The Study Group was also asked to analyze how the issues around educational technology intersect with other reforms being undertaken by school systems, including the Common Core and other college- and career-ready standards, the emergence of robust data systems, the upcoming next-generation assessments, the burgeoning number of virtual courses and schools, and efforts to address digital bullying and other aspects of the social and emotional health of students.

In organizing its work, the Study Group framed its findings and recommendations around three areas:

- Addressing the Voice and Needs of Today’s Students;
- Ensuring Educators Can Use Technology in Meeting the Needs of Today’s Students; and
- Building Educational Technology Infrastructure: Preparing for Technology of the Future.

These areas make up the three main chapters of the report, and the key takeaways and recommendations from these chapters are summarized below. But there is one other overarching point about which the Study Group was very clear: state boards of education along with their state education agencies are key to providing the leadership on education technology issues our school systems need to ensure students are ready for life and work in a digital era.

Many forces are at work today that make such state leadership essential, including the primacy of state responsibility for education, the need for interstate collaboration around a host of technology and other issues, the growth and reach of statewide data systems, and the importance of broadscale educator training and support related to technology.

There is also a disruptive factor in technology because of its continuing role in transforming so much of education
as we have known it. Later in this report, we reference the “wild, wild West” nature of the current landscape around educational technology. From virtual schools and online courses to the growing use of personal digital devices in schools and open-source instructional materials, much about technology is still in flux. Because of their formal responsibilities, state education systems are the only entities able to offer a sustainable platform for aligning these promising—but still fragmented and rapidly changing—forces. As Gov. Bob Wise, president of the Alliance for Excellent Education, told the Study Group:

State boards will be at the center of the education conversation on the role of technology in improving student learning throughout the next three years.... We must have a strategy and plan.

Gov. Wise also noted that the vital components of such a strategic plan are still in question—which only increases the urgency around such work. Fortunately, state boards are positioned to provide the unifying vision for the many aspects of the education technology landscape, a vision that identifies the intersection of student learning needs, teaching, and the infrastructure needed to undergird this teaching and learning. Without such a broad purposeful approach, education systems are likely to pursue a fragmented course that merely addresses individual policy issues as they happen to arise—and states will miss a critical opportunity to comprehensively move teaching and learning forward in support of this, and the next, generation of students.

CHAPTER 1. Addressing the Voice and Needs of Today’s Students

Much has been written about the cohort of students in school today, who are generally considered digital natives. Commentators frequently point out how these children have always lived with computers in their homes, cell phones in everyone’s pocket, and hundreds of channels available on their televisions. They easily adapt to every new piece of technology that arrives in the marketplace and can text as easily and quickly as adults can talk. They are constantly “plugged in.” For this generation, there is no divide between “technology” and their daily lives.

Today the combination of immense portable computing power, digital communications, and the Internet presents education with an enormous number of opportunities, challenges, and imperatives. There is the imperative, for example, that all students be digitally literate, which will require educators to meet students in the technological world where they now live in order to bring them to a new place. There are the challenges that come with ensuring students are good digital citizens—that they understand the potential consequences, negative and positive, of anything they put out on the web, understand plagiarism, and how to harness the power of technology safely, respectfully, and responsibly. Finally, there are the vast opportunities technology brings as a vehicle for enhancing the learning process through greater personalization of instruction—something leaders may need to address through policies that provide the flexibility and incentives needed to allow educators to take advantage of these opportunities.

Key Takeaways

• 77% of 12- to 17-year-olds own cell phones, and 23% of those are smartphones; these statistics do not vary by race, ethnicity, or socioeconomic status;

• 75% of American teens have a social networking site;

• 33% of teenagers say that texting is their favorite way to communicate;

• Older teen girls send more texts than any other group, an average of 100 daily, compared with 50 daily texts from boys of the same age; and

• 30% of students in grades 6–8 and 46% of students in grades 9–12 are using sites such as Facebook and YouTube to collaborate with each other on school projects.
mean students automatically know how to use it as a tool for learning. Students still need to be taught foundational research skills and processes that can be enhanced by technology use. This means students—and educators—need to understand that doing research is more than just sorting through what pops up via online search engines.

- Internet information often does not have the ordered structure provided by textbooks or other resources for students. Educators need to be sensitive to this, and to their students frame of reference in regards to online searches, when integrating technology into their lessons.

- With increased access to many different types of tools for learning and socializing and ever-increasing multi-tasking, it has become even more important to teach students how to focus their attention.

- One of the great advantages of technology is its potential for personalizing instruction. Students are used to being able to personalize how they receive information—and when schools don’t present information in the same way, they sometimes become bored and disengaged. Instruction should be designed to take advantage of each student’s personal style of learning.

- Because online problems can cause disruptions at school, there is a role for schools to help students learn to be safe, responsible, and respectful digital citizens. But in order to do so, school teachers and staff have to be prepared and equipped to monitor and instruct students in safe environments that are close to what they will experience once the filters and monitoring are removed.

**Recommendations**

1) **Address digital citizenship and digital literacy.** These are relatively new areas for education leaders to address through the creation of policies and programs. It is important for policymakers to realize that every school community is different and each is starting at a different place. Some will be ready to institute integrated curricula, while others first need to create common definitions. The study group recommends that state boards urge their districts and schools to address the critical areas of digital citizenship and digital literacy and ensure that the state education department is prepared to offer resources and guidance for these discussions.

2) **Design instruction to take advantage of how each student learns now.** It is time to revisit what “school” is and how education policymakers can ensure that their decisions create a learning environment that best fits current learners’ needs. Policies at the state and local levels should be responsive to student’s lifestyles and behaviors at home and in the classroom.

3) **Create policies that allocate resources based on data, student needs, and student, parent and stakeholder voices.** These key stakeholder groups understand the complexities of the issues involved, and can provide the most accurate feedback about what solutions might work best. Additionally, providing access to student performance data to parents and students can also help them serve as an informed partner in ensuring that student study habits, methods and schedules are most conducive to learning outside of school hours.

**CHAPTER 2. Ensuring Educators Can Use Technology in Meeting the Needs of Today’s Students**

Truly realizing the promise of technology in schools is dependent on the ability of educators—teachers, administrators, specialists, and support staff—to reinvent students’ learning experiences in ways that reflect and take advantage of the digital opportunities that are so much a part of 21st century life.

Ideally, we need school leaders who help communities think very carefully about what learning goals they have for their students, their faculty, and themselves, and then look at how technology tools can support those learning initiatives. It’s not about “using more tech” or even about “using technology to boost engagement,” since what is engagement without direction? The fundamental issue is how do we think about the kind of learning experiences that will prepare people for work, for our democracy, and for a well-lived life, and to what extent can technology support those kinds of learning experiences.

– Justin Reich

“EdTech Researcher” (blog), *Education Week*
Unfortunately, the nation’s progress in ensuring our educators have the pedagogical training, technological tools, and flexible educational environments needed to provide high-quality digital learning has been mixed at best. Many educator preparation programs do not provide adequate focus on the teaching skills, dispositions, and strategies needed to thrive in a technology-rich school or reflect the digital learning environments we want to create in our K-12 classrooms. Professional learning for teachers too often has not kept pace with advances in technology or new ways of learning, even as the number and quality of these opportunities have fallen significantly due to budget cuts.

Meanwhile, the turnover rate among new teachers—who are also among those most likely to be digital natives—remains very high: one-third leave within their first three years in the classroom, and almost 50 percent leave within their first five years, meaning that much of the training that does take place goes to waste. Finally, educators who want to be innovative about digital learning in an “anytime, anyplace” environment often find themselves stymied by policies and procedures that are not flexible enough to accommodate such strategies.

The Study Group examined five areas related to educators and technology that address these issues and concerns. They include:

- Developing a vision of a “connected educator”;
- Establishing the state’s vision for technology and education in standards;
- Making technology-related improvements in educator preparation;
- Using technology and job-embedded professional learning to improve practice; and
- Increasing flexibility around time, place, and pace for learning.

These discussions led to the following takeaways and recommendations.

**Key Takeaways**

- The nation’s progress in ensuring our educators have the pedagogical training, technological tools, and flexible educational environments needed to integrate digitally based strategies and resources into their instruction has been mixed at best. This will continue to be important as research has found that newer teachers aren’t any more likely to integrate technology into instruction than veterans.

- States and districts should promote the vision of “networked educators” who form communities of practice through the use of technology and social media. This can help teachers break away from traditional isolated classrooms, provide opportunities for collaboration and professional learning, and help increase teacher retention.

- Do not neglect the role of school leaders when it comes to leading a school forward in technology. This will require very intentional work on the part of states and districts—with the average age of principals hovering around 50, it will be some years before a large portion of school leaders are digital natives.

- States can promote their vision for technology in relation to educators through sets of standards that go beyond students and teachers to cover administrators, online teaching and online courses, technology coaches, and special needs teachers.

**Recommendations**

1) State boards of education, in collaboration with the state education agency, state technology officer, and relevant stakeholders, should create a statement, definition, or visionary document defining what a connected and networked educator looks like within the state.

2) State boards, in collaboration with relevant stakeholders, should examine what opportunities, incentives, and barriers are in place that inhibit and enhance
the ability for districts to partner with each other, or across state lines, to share resources.

3) State boards should examine the policies in place that allow or inhibit the ability for online, virtual, and blended learning opportunities for students and teachers.

4) State boards should reexamine the weekly and yearly school calendar to allow districts and schools autonomy to create a schedule that provides additional flexibility and time for students to learn through alternative means and for educators to connect.

5) State boards, in collaboration with licensing boards and program accreditation committees, should ensure that teacher candidates have fundamental skills and content knowledge to teach students in a 21st century environment and are able to use student data to personalize instruction.

6) State boards should ensure that teacher candidates, no matter their path to the profession, have robust clinical experiences where technology and online learning is incorporated into the program.

7) States, districts, and schools should expand professional learning experiences to include online and virtual learning.

8) In collaboration with districts and the state education agency, state boards should ensure that teachers are provided with high-quality professional learning and mentorship opportunities embedded throughout the school day through technology. Steps to ensure this include:

- Defining, implementing, and monitoring effective professional learning;
- Engaging with the state education agency, governor’s office, and legislature to ensure adequate funding and flexibility for pathways and programs for professional learning;
- Funding a cadre of coaches who can serve as educator effectiveness experts and technology experts;
- Incorporating opportunities to collaborate virtually into the state’s mentorship and induction process; and
- Incorporating technology and digital literacy into educators’ trainings on Common Core standards.

CHAPTER 3. Educational Technology Infrastructure

Technology integration in the classroom means more than providing a new tool for teaching students in the same old ways. Meaningful technology integration in the classroom has the ability to transform and personalize learning for all students. To achieve this vision, however, thoughtful planning and implementation of a robust education technology infrastructure is a must. An up-to-date education technology plan that proactively tries to anticipate the technology needs of schools in the state will need to be a vital component of education policy. The ability for a state to develop this vibrant and effective education technology infrastructure will play a significant factor in being able to connect and engage with students through technology in the ways that benefit their learning and via media they prefer. Some of the core areas states should address include:

- Access and equity in technology infrastructure;
- Developing data systems that provide timely, meaningful information to stakeholders, educators, and policymakers;
- Navigating the transition to digital instructional materials; and
- Supporting blended and online learning opportunities.

State boards have the unique position and authority to support a robust education technology infrastructure through thoughtful examination of these issues. Similar to how good education policy provides a framework to support the education system, a robust education technology infrastructure provides the foundation of support needed to implement technology effectively across a state.

Almost 80 percent of schools that receive Federal E-Rate funding for broadband say their Internet connection does not fully meet their needs. Almost half of the E-Rate funded schools have an Internet connection of 3 megabits per second (Mbps) or less. To put this in perspective, 3 Mbps is slightly below the recommended bandwidth for one residential household in the FCC’s National Broadband Plan.
following are the key takeaways and recommendations for state’s educational technology infrastructure.

**Key Takeaways**

- States should determine the current state of their districts’ and schools’ capacity to integrate technology in meaningful ways in the classroom including access, broadband, and human capital. State’s need to know if their schools have the capacity to provide online assessments.

- Bandwidth is increasingly becoming a major factor in today’s digital divide, especially for rural districts and schools.

- States should use both the results of the assessment consortia’s readiness survey and additional information gathered to assess technology equity between districts and schools.

- States have come a long way in terms of data systems and their use, but there is still a ways to go. Only three states have implemented policies and practices, including professional development and credentialing, to ensure educators know how to access, analyze and use data appropriately. In addition, only six states share teacher performance data with education preparation programs.

- A robust state data system is essential, but it is not sufficient. Educators must have ongoing training and support if they are going to be effective in improving instruction and advancing the education system.

- Access to data is critical if the system is going to be effective—but so is privacy. States should consider providing segmented access to the data system for stakeholders in ways that still respect student privacy.

- States should provide sufficient flexibility so districts and schools can acquire and use digital textbooks. However, this also makes it more important for states to provide guidance to help school districts evaluate the quality of different online and content products to help determine what best meets their needs?

**Recommendations**

1) Ensure that every student has adequate access to a computing device and the Internet at school and home, with sufficient human capital in schools to support their effective use. Education technology infrastructure-building will be a key aspect of ensuring equity and access in schools and communities moving forward. However, technology acquisition is just one piece of an effective education technology plan for a state. Policymakers also need to ensure that after the state, districts, and schools develop sufficient technology infrastructure, educators know how to use these tools to improve instruction.

2) States should have an up-to-date technology plan and policy that is reviewed on a pre-determined timeline. Technology typically stands alone in education, treated as a discrete subject like math or history. However, given the impact technology can have on transforming the entire education system to bring a personalized learning environment to every student, policymakers need to develop a state technology plan that provides a vision for how and where technology can change the way educators interact with students to facilitate learning. A robust education technology plan should include everything from instructional practices to teacher preparation and professional development and how technology can support every aspect of the education system.

In addition, since the technology landscape rapidly changes, it is important that both technology plans and policies are flexible enough to allow future technologies to flourish and are reviewed on a regular basis to ensure they are still relevant and do not hinder effective integration of technology into the classroom in meaningful and powerful ways.

3) States and districts should address the interoperability of devices, software and data. As more and more students start using their own devices in an education setting and as technology continues to evolve, it is important that the ways students interact with the devices remains consistent regardless of device. Therefore, it is important that all devices, regardless of operating system, are able to efficiently and effectively interact with students and are supported by schools.

Additionally, to facilitate vibrant use of data systems, it is important that the data stored in them is accessible to stakeholders in a variety of ways, including providing parents access to relevant information such as student achievement scores that can be downloaded for use on other platforms.
Much has been written about the cohort of students in school today, who are generally considered digital natives. Commentators frequently point out how these children have always lived with computers in their homes, cell phones in everyone’s pocket, and hundreds of channels available on their televisions. They easily adapt to every new piece of technology that arrives in the marketplace and can text as easily and quickly as adults can talk. They are constantly “plugged in.”

But the study group wanted to go beyond these stereotypes to examine more fully the characteristics, habits, and beliefs around technology of today’s students’—and understand what these attributes mean for education. This chapter first provides a statistical and research-based portrait of technology and today’s students, and then uses this portrait to examine the opportunities, imperatives, and challenges that technology and its impact on students brings to educators and policymakers.

A. The Digital Lives of Students: A Portrait

Clearly, the defining characteristic of students today that sets them apart from previous generations is their near universal and ready access to a wide array of digital technology. The majority of 12- to 17-year-olds own cell phones, many of which are smartphones—statistics that do not vary by race, ethnicity, or socioeconomic status. For all devices, 8- to 18-year-olds clock in at 6.5 to 9.75 hours of media use per day, again regardless of socioeconomic status or if they are living in a single- or two-parent family (although white youth are at the lower end, while black, Hispanic, and Asian youth are at the higher end). About half the time they are using media, youth are using more than one device at once, and there are no significant racial differences in how youth multitask with media—most seem to do it often, especially when watching TV. Some also use media most of the time they are doing homework.

In addition to being passive consumers of media, communicating via different forms of technology is also a large part of daily life for this generation. The average teenager sends 60 text messages a day, up from 50 daily texts just two years ago. Older teens and boys are beginning to text more than before, but older girls are still sending more texts than any other group, an average of 100 daily, compared with 50 daily texts from boys of the same age. Most American teens also have a social networking site, with just over half visiting their profile daily, and a third visiting several times a day.

Some adults worry that teenagers’ increased use of social networking for communication is replacing face-to-face communication—and there is some truth to this. A third of teenagers say texting is their favorite way to communicate, reportedly because it is quick, easy, private, and it gives them more time to think about how to respond. Half of all
By the Numbers: The Current Context of Students’ Digital Lives

Technology Use
- 77% of 12- to 17-year-olds own cell phones, with 23% of those being smartphones—statistics that do not vary by race, ethnicity, or socioeconomic status.5
- Minority 8- to 18-year-olds (black, Hispanic, and Asian) consume an average of four-and-a-half more hours of media each day than white youth of the same age, regardless of socioeconomic status or if they are living in a single- or two-parent family.6
- 68% say that send text messages every day.7
  - The average teenager sends 60 text messages a day, up from 50 daily texts just two years ago.8
  - Older teen girls send more texts than any other group, an average of 100 daily, compared with 50 daily texts from boys of the same age.9
- 49% of teenagers surveyed reported that talking to others in person is still their favorite way to communicate.10
- 33% of teenagers say that texting is their favorite way to communicate.11
- 22% of American 13- to 17-year-olds have a Twitter account, with 11% tweeting daily.12

Social Media Use
- 90% of American 13- to 17-year-olds report having used social media.13
- 75% of American teens have a social networking site, with
  - 51% visiting their profile daily and
  - 34% visiting several times a day.14
- 68% of American 13- to 17-year-olds say Facebook is their most frequently used social network site.15
  - Most teens who have a social media profile (62%) say it is most often set to be private, only sharing content with their friends.16
  - 59% of 14- to 17-year-olds say they have reconsidered posting something online after they thought about the possible negative implications, while only 46% of 12- to 13-year-olds reported the same.17

Impact of Social Media
- When American teenagers were asked how they feel about social networking:
  - 29% said it makes them feel less shy,
  - 15% said it makes them feel better about themselves,
  - 28% said it makes them feel more outgoing,
  - 20% said it makes them feel more confident,
  - 19% said it makes them feel more popular,
  - 19% said it makes them feel more sympathetic to others, and
  - 5% said social networking makes them feel less outgoing, shyer (3%), and worse about themselves (4%).18
- 69% of teenagers who use social media think their peers are mostly kind to each other on these sites, but 20% say that the interactions are mostly unkind and 88% have seen someone be mean or cruel to another person on a social network site.19
- 52% of teenagers say social media has mainly helped their relationships with friends, while only 4% say it has mainly hurt their relationships with friends.20
- 37% say it has helped their relationships with family members, while only 2% say it has hurt their relationships with family members.21
- 88% of teenagers report using social media to keep in touch with friends they can’t see regularly and 69% use social media to get to know other students at their school better.22

Technology Use for Schoolwork
- 30% of students in grades 6-8 and 46% of students in grades 9-12 are using sites such as Facebook and YouTube to collaborate with each other on school projects.
- 32 – 39% of students would like their schools to provide tools for communicating with their classmates, organizing their schoolwork, communicating with their teachers, and collaborating with their classmates on school assignments.
- Students also wish they had school-wide Internet access, safe chat rooms to discuss course materials with their classmates, and school portals that provide timely access to key school and class information.23
- 36% of students that indicated they were interested in online learning also said reading digital text was better for their personal learning style. However, only 28% of all students surveyed felt the same way.24
teenagers still say that talking to others in person is their favorite way to communicate. They think this is more fun and find it is easier to understand what people really mean when they are with them in person.\textsuperscript{25}

So far, it appears that rather than replacing real-world relationships, teenagers find ways to use social media to enhance them. Most say social media has mainly helped their relationships with friends, and many say it has helped their relationships with family members. In fact, the majority report using social media to keep in touch with friends they can’t see regularly. Additionally, most use social media to get to know other students at their school better and connect to people with whom they share common interests.\textsuperscript{26} And many teenagers report that social networking makes them feel less shy, and some say it makes them feel better about themselves, more outgoing, confident, popular, and sympathetic to others.\textsuperscript{27}

When it comes to some of the well-publicized negative aspects of communicating via social media (meanness, cruelty, bullying), there is some disagreement among teens about how prevalent such behavior is. Most teenagers who use social media think their peers are mostly kind to each other on these sites, but some say the interactions are mostly unkind—and most have seen someone be mean or cruel to another person on a social network site. There are no differences among those who have seen mean behavior online, which means that the perpetrators do not vary by age, gender, and come from families at all income levels.\textsuperscript{28}

At the same time, there is evidence that young people are learning how to protect themselves while online. Most teens who have a social media profile say it is most often set to be private, only sharing content with their friends.\textsuperscript{29}

Concerns about the negative aspects of online communication sometimes prevent schools from creatively expanding their use of social networks and other forms of technology. However, even if it is not provided or supported by their school, many teens are already using sites such as Facebook and YouTube to collaborate on school projects. Students would like their schools to provide tools for communicating with their classmates, organizing their schoolwork, communicating with their teachers, and collaborating with their classmates on school assignments. They also wish they had school-wide Internet access, safe chat rooms to discuss course materials with their classmates, and school portals that provide timely access to key school and class information.\textsuperscript{30}

Their increased use of digital devices also tends to make students more comfortable with being connected around the clock. Some teenagers admit to sleeping with their cell phones in their beds so they can carry on text conversations with friends throughout the night. This generation of students is also more comfortable with multitasking.\textsuperscript{31} They naturally want to listen to music while doing online research and can hold a texting conversation with a handful of friends at the same time, sometimes while watching TV. This ability may not come as easily to adults,\textsuperscript{32} and they may not be inclined to engage in rampant multitasking. Because of this, and because of the piecemeal way technology first entered the educational arena, schools often treat “technology” as a stand-alone subject, with stand-alone computer labs and lessons in cyberbullying and online research separated from other instruction. However, today’s students have never lived in a world where the Internet wasn’t in their homes and cell phones weren’t in everyone’s pocket. For them, there is no divide between “technology” and their daily lives.
Finally, in looking at how technology has shaped students’ lives, it is important for educators and policymakers to recognize that one feature technology has brought to society is an incredibly personalized experience with media and many other types of communication. In contrast to having one TV in the household that could only access a handful of channels and one newspaper that was delivered on the doorstep each morning, today’s students were born into a world with seemingly unlimited ways to access information and entertainment. As technology advances, it is also a world that offers seemingly unlimited choice in how, when, and what people access. Students are accustomed to being able to choose which tweets they receive, how to see information on their Facebook news feed, and what types of news alerts are texted to them. Being used to creating a streamlined process for receiving only information that interests them has raised expectations for interacting with the world that can make it difficult for students to become engaged in a school environment that doesn’t allow for such personalization.

These, then, are the students in school today, remembering that for the youngest students born in the post-Millennial era, some of these descriptors are even more extreme: not only don’t they remember a life without cellphones, they have little memory of a world without smartphones or tablets.

While keeping this portrait of today’s students in mind, the rest of this chapter explores the role schools and the entire education community play in ensuring students are digitally literate and learn to be responsible digital citizens. Great opportunities and challenges exist for education policymakers as technology becomes more fully integrated into the nation’s classrooms. These will be further discussed as well as best practices and other actions that can be taken to create school environments that foster technology use as a tool to increase student achievement.

B. Digital and Media Literacy

No other area of education skills and knowledge has grown and changed so quickly as technology. It is hard to believe that only 15 to 20 years ago technology goals were still focused on ensuring students had access to and knew how to use computers. Today it may no longer even be necessary to teach students how to use the Internet as a tool to find information. On the other hand, it has become more important than ever to teach them how to find credible information. This is but one aspect of what has

Media Literacy Needed for All Students

Students’ use of the Internet is not merely a technology issue for educators, but a reading comprehension issue, as well, according Donald Leu, Director of the New Literacies Research Lab at the University of Connecticut. Speaking to participants at NASBE’s “Educa...
become known as digital and/or media literacy. Literacy used to be limited to understanding the written word and other forms of one-way communication. But today, multiple forms of interactive media make it necessary to teach students to think more critically in order to analyze and understand the meanings behind these digital creations. They should also know how to assess their legitimacy, recognize hidden messages, and how to communicate this information to others. Mastery of critical thinking is a long process, and even teenagers are just beginning to develop these skills, so it can be hard for students to realize that just because something is posted online, it may not be true. It is a tough lesson to grasp that adults may be manipulating readers’ interpretation of something for one reason or another.

A third of students say they or someone they know has had a bad experience due to information they found online or in an email. Though they know not all online information is credible, the majority (89 percent) of students think that “some” to “a lot” of this information is believable, and they think it is more credible for use in school papers or projects than books. They do not trust blogs, but do find Wikipedia to be a good source of information. Younger students seem to be more easily fooled by false information online, with older students having better skills to assess credibility. Luckily most (73 percent) report receiving some form of information literacy training, and the majority of parents say that they have talked to their children about whether or not to trust Internet information. However, though they are receiving some instruction on how to assess the credibility of online information, even older, high-achieving students fail to do so at times, making assumptions and taking mental shortcuts that don’t always prove to be reliable.33

Constant access to unlimited amounts of information also presents new challenges to traditional curriculum and instructional practices. For example:

- Textbooks, encyclopedias, and other traditional sources of research material tend to present information in an organized way, frequently using themes or chronology or both, and provide a context that is designed to easily lead the reader through understanding the most relevant parts of the information. Internet searches, on the other hand, force users to sort through information on their own. This lack of organized context can make online research more challenging, especially when the information is organized by popularity or possible relevance to a search term rather than by date, accuracy, or legitimacy of source.34

- In addition, with increased access to many different types of tools for learning and socializing, it has become even more important to teach students how to focus their attention. Previously, passing notes or daydreaming when staring out the window were the main distractions that concerned classroom teachers. Reminding students to pay attention is an entirely different problem when they have small computers in their pockets that allow them to communicate with others around the clock. And unlike traditional textbooks, websites are designed to present large amounts of information in one place at the same time, letting the user decide what is most interesting to them. This format makes it easy for students to be distracted by something that may not be as directly related to what they were actually looking for. Even a simple Internet search can lead students on completely unrelated tangents if they aren’t focused.35

Chart 1 on page 17 provides common elements of digital literacy that are widely used nationally and internationally.

C. Digital Citizenship—Implications for Behavior at School and Off Campus

Just as technology has made it imperative that educators add digital or media literacy to the other “literacies” schools must teach (ranging from math and science literacy to financial literacy), the Internet and social media have also created a need to define and teach about a set of behaviors and dispositions around technology use commonly described as “digital citizenship.”

While most students arrive at school today—even in the earliest grades—knowing how to use a computer, it does not mean they understand the implications of all of the their actions online. Student behaviors that tend to cause some of the biggest problems for a school, such as complaining about teachers or hurting other student’s feelings with gossip, aren’t new. But there are now different
Part of the difficulty for students is that communicating with others without actually being in their presence can lead to disinhibition, the feeling that one is invisible and, as a result, more likely to take risks. Communication online is also done at a distance, and can easily be done anonymously or by someone assuming another identity. Additionally, a lack of context or a variable context of a one-way transmission can make it hard to accurately interpret information as the sender intended it to be received. When two people watch the same thing, it is common to have different interpretations due to their knowledge of the topic, life experiences, or even mood or surroundings at the time they are receiving the information. This also means that the same information may be understood differently by students of different ages.

The good news is that the vast majority of parents of online teens have talked to their child about what kinds

<table>
<thead>
<tr>
<th>Element / Definition</th>
<th>Competencies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Access</strong>: Knowing about and knowing how to collect and/or retrieve information.</td>
<td><strong>Competencies</strong>: Search, find, and retrieve information in digital environments.</td>
</tr>
<tr>
<td><strong>Manage</strong>: Applying an existing organizational or classification scheme.</td>
<td><strong>Competencies</strong>: Conduct a rudimentary and preliminary organization of accessed information for retrieval and future application.</td>
</tr>
<tr>
<td><strong>Integrate</strong>: Interpreting and representing information, summarizing, comparing, and contrasting.</td>
<td><strong>Competencies</strong>: Interpret and represent information by using ICT tools to synthesize, summarize, compare, and contrast information from multiple sources.</td>
</tr>
<tr>
<td><strong>Evaluate</strong>: Making judgments about the quality, relevance, usefulness, or efficiency of information.</td>
<td><strong>Competencies</strong>: Judge the currency, appropriateness, and adequacy of information and information sources for a specific purpose (including determining authority, bias, and timelines of materials).</td>
</tr>
<tr>
<td><strong>Create</strong>: Generating information by adapting, applying, designing, inventing, or authoring information.</td>
<td><strong>Competencies</strong>: Adapt, apply, design, or invent information in ICT environments (to describe an event, express an opinion, or support a basic argument, viewpoint or position).</td>
</tr>
<tr>
<td><strong>Communicate</strong>: Communicating information persuasively to meet needs of various audiences through use of an appropriate medium.</td>
<td><strong>Competencies</strong>: Communicate, adapt, and present information properly in its context (audience, media) in ICT environments and for a peer audience.</td>
</tr>
</tbody>
</table>

Note: Existing international and national digital literacy frameworks and assessment instruments all share these common elements.

of things should and should not be shared online, ways to use the Internet and cellphones safely, how to behave toward other people online, and what their child specifically does online. Indeed, most teens regularly report that their parents are the biggest influence when making judgments about what is appropriate when using the Internet and cellphones.36

The bad news is that while education is catching up, most teachers and school staff have not been adequately prepared to deal with the negative implications of students’ online behavior when it becomes an issue in the classroom. Addressing these issues and dealing with them before they get out of hand is made more difficult for both parents and educators because the chain of communications leading to a disturbance or behavior issue that erupts during the school day and on the school campus might be almost invisible to adults, while at the same time highly visible to a large group of students. Not being plugged into students’ online social networks, adults can struggle to effectively monitor these interactions.

Another difficulty is that to date, many school systems have been hesitant to intervene in students’ worlds when they are away from school campuses. The judicial system has so far sent mixed messages about the extent to which school officials can take action regarding students’ off-campus behavior, and the U.S. Supreme Court has yet to rule on a defining case in this area, making it even trickier to navigate the grey area of districts’ authority to intervene. Yet there is little doubt that students’ behavior, even when they are in their own bedrooms, can lead at times to problems in the classroom the next day. Communicating with peers online happens twenty-four hours a day, and often, as noted above, in ways that are invisible to most adults. Even when communications don’t cause trouble at school, injudicious postings about personal behavior now have a way of staying alive for decades, with the potential of causing problems for individuals months or years down the road. For all these reasons and more, the study group believes that schools must be partners with families in teaching young people how to be good digital citizens.

A digital citizen knows how to harness the power of technology safely, respectfully, and responsibly. It is important to teach students that they are citizens of the online world, and that their digital actions can have negative consequences as well as benefits. Similar to driver’s education, schools can help students learn by creating situations where their mistakes become teachable moments. They need to be taught that different situations require different ways to communicate. But in order to do so, school teachers and staff have to be prepared and equipped to monitor and instruct students in safe environments that are close to what they will experience once the filters and monitoring are removed.

When it comes to incidents of cyberbullying and other types of online behavior, it is important for adults to remember that perception is reality. If a student feels embarrassed or feels that another student is being hateful toward him, regardless of how it may appear to others, the

---

For Policymakers, A Need to Balance Student Needs and Protections

Increased technology use—and all of the benefits and concerns that come with it—are fundamentally changing many facets of society. Faster ways to communicate mean different expectations for response times. More public ways to communicate mean different thought processes are required before sharing information. Lawmakers, the judicial system, and businesses often struggle to keep up with this “new normal” of technological change, and schools are no exception. The stumbles and problems that result can be both instructive and chilling as people everywhere learn how to most effectively use new forms of technology—and the media has quickly learned to capitalize on that by spreading the most interesting stories more widely than was ever thought possible.

Unfortunate and deeply disturbing cases of students committing suicide as a result of cyberbullying, or students being arrested for texting suggestive pictures to their underage boyfriends or girlfriends, are real and have profoundly impacted some communities. It is important for policymakers to keep the possibility of these incidents in mind, but to not let these incidents inhibit the opportunity to teach about the responsible use of devices. Teaching students and teachers to use technology as one tool, while providing them with the knowledge they need to make responsible decisions for using all communications tools, can create a strong foundation for integrating all types of technology in to the school environment.
student’s reaction is valid and should be treated as such. Adults may feel their own social networking use helps them understand how students interact online. But a key difference is that adults can often opt out of online social networks temporarily or selectively with little consequence, since it is likely there is inconsistent use among their friends. For teenagers, social networks constitute such a vital and large portion of their social lives that refusing to participate or making a poor decision often has vastly more significant consequences that adults have trouble comprehending.

Digital citizenship reaches into the academic world, as well. One reason so much dishonest or uncredible information can be found on the web is that it is common—and encouraged—in online culture to take something that already exists and then alter it creatively to make something new. Over 35 hours of video are uploaded to YouTube every minute. Facebook users share more than 30 billion pieces of content each month, and the average user creates 90 pieces of content in a month. Schools can design class assignments that benefit from students’ inclinations to share and collaborate with others online. The flip side of this, however, is that because digital media is so participatory, it can be difficult to teach students about the ethics behind plagiarism and copyright laws. When intellectual property was tied solely to a physical object like a book or a cassette tape, it was easy to understand how the act of physically making a copy was illegal. Now that content is so widely and freely distributed, it is harder for students to see the line between creativity and theft, especially when even the court system is having a hard time figuring out where to draw it. In addition, technology makes it easy for something that is shared to be manipulated in a way that the initial sender did not intend, permit, or wish to happen.

Some of the issues around digital citizenship are so new that schools and students still need to learn a common vocabulary that will help them talk about and through different situations. Without a common understanding of terms like “post,” “chat,” or “text,” it is hard to be sure everyone is conceptualizing the same thing. Additionally, the new behaviors and skills that must be developed should be defined in a way that allows every member of the school culture to talk about them and monitor each other’s use of them. Schools should find age and developmentally appropriate ways to integrate these lessons into all subjects, so they are learned in real time as they are being used, and so contribute to a safer school climate that values responsible technology use.

School librarians, the traditional access point for information at a school, can continue to be a key resource for teaching both digital literacy and citizenship. Now that school libraries are much more than a collection of magazines and books, job titles are changing to more accurately reflect the responsibilities of these staff members, such as to “Library Media Specialist” who has an office in the school’s “Media Center.” Librarians can also be helpful for teaching students how to search for and assess information online and explain the ethical principles of online research.

Many schools have students, and sometimes parents, annually sign policies that specify appropriate use of school Internet access and other forms of technology, as well as what is allowed on the school campus. When creating such policies, schools need to find a balance between identifying specific types of technology that may be used inappropriately, and addressing behaviors that are appropriate regardless of the type of device. Though “Acceptable Use Policies” has been the most common term for these agreements, some schools are now using “Responsible Use Policies” to reflect that they have moved past merely allowing technology to be used and are now teaching students how to use technology resources in participatory and interactive ways. For many schools, it is no longer a question of whether or not cell phones are acceptable at school, but more about how to responsibly use them during school hours in a way that doesn’t interfere with instruction. For these policies to remain relevant, they need to be revised in a timely manner to keep up with the evolution of technology and its use in the classroom and daily lives of students. Creating a school technology community that drafts and updates these policies, as opposed to a staff member acting alone, can be one way to get input and secure the buy-in of students and families.

D. Opportunities and Challenges for the Future

Today the combination of immense portable computing power, digital communications, and the Internet presents education with an enormous number of opportunities, challenges, and imperatives. In addition to meeting the imperative that all students be digitally literate and addressing the challenges that come with helping students become good digital citizens, education leaders need to create policies that promote the opportunities technology brings as a vehicle for enhancing the learning process through greater personalization of instruction.

Using Technology to Personalize and Engage

As technology is increasingly incorporated into schools, many educators are now asking whether having students
<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Amount of Information</strong></td>
<td><strong>Organization of Information</strong></td>
</tr>
<tr>
<td>• Information available on practically anything students want to know</td>
<td>• Too much information pressures students toward passive acceptance of whatever they find to avoid an unending search</td>
</tr>
<tr>
<td>• Multiple formats and languages</td>
<td>• Information accepted if found quickly and easily; little in-depth probing</td>
</tr>
<tr>
<td>• Levels from novice to expert</td>
<td>• Participatory organization (tagging and organizing text for own personal and academic use)</td>
</tr>
<tr>
<td>• Natural language searching</td>
<td>• Lack of sequence and hierarchy in information (order has nothing to do with time, place, or even synchrony with researcher’s main idea)</td>
</tr>
<tr>
<td>• Platform of tagging provided by others</td>
<td>• All information presented with equal importance</td>
</tr>
<tr>
<td><strong>Type of Information</strong></td>
<td><strong>Access to Information</strong></td>
</tr>
<tr>
<td>• Diverse formats (visual, oral, graphic, video, audio)</td>
<td>• Specific information with little or no contextualization</td>
</tr>
<tr>
<td>• Diverse types, from personal opinion to research</td>
<td>• Lack of general overview information</td>
</tr>
<tr>
<td><strong>Interactive Environment</strong></td>
<td><strong>Interactive Environment</strong></td>
</tr>
<tr>
<td>• Multi-tasking</td>
<td>• Pressure for speed</td>
</tr>
<tr>
<td>• Consolidation of devices—one-stop information access</td>
<td>• Widening digital divide</td>
</tr>
<tr>
<td>• Collaboration and shared learning</td>
<td>• Environment favors access over reflection</td>
</tr>
<tr>
<td>• Deepened learning through social interchange of ideas</td>
<td>• Individual voice is lost in group dynamic</td>
</tr>
<tr>
<td>• High engagement and participation by all, even the shy and reluctant</td>
<td>• Ability of individuals to post and publish leading to assumption of authority (e.g., “If I said it and it’s on the Web, then I must be an expert.”)</td>
</tr>
</tbody>
</table>

in the same room, learning the same thing at the same time, is the most efficient way to teach when the reality is that students grasping the material at different paces and in different ways. Technology can be used to vary the pace of learning for individual students, which can be a way to keep everyone engaged. Silent Epidemic: Perspectives of High School Dropouts, recently published by the Bill and Melinda Gates Foundation, reported that 47 percent of the dropouts interviewed by the authors said a major reason for dropping out was that classes were not interesting.\(^{40}\) Schools can take advantage of students’ natural instinct to go online to learn more about the subjects that most interest them by allowing students who have mastered a basic level of understanding to move ahead. At the same time, schools can help alleviate the frustration that can come with not having enough time to master a subject before the teacher moves on by using technology to identify and assist students who need more time and attention in a given area.

Schools should also find ways to take advantage of students’ natural interest in being connected 24 hours a day, seven days a week. In a 2011 survey of more than 300,000 K-12 students, 65 percent said that not being able to use their personal mobile device at school was an obstacle to learning. Fifty-three percent of middle school students said that online learning would allow them to work at their own pace and be in control of their own learning.\(^{41}\) Many students also wanted to use their mobile devices to capture and access information. Seventy-eight percent said that they would like to use a mobile device to record lectures or labs in their traditional classes so they would be able to review them whenever they needed to.\(^{42}\)

Schools are also starting to use online and blended learning as a way to solve scheduling conflicts and provide student access to instruction when they don’t have adequate staff capacity. Athletes, students with learning and physical disabilities, and students with language barriers could all benefit from the creative and flexible use of technology for instruction. Forty percent of schools don’t offer AP classes, commonly because they are unable to afford or find the teachers.\(^{43}\) This is particularly a problem in rural or low-income communities. However, some districts are bringing teachers in to lecture via video conference as a way to expand course offerings. But state and district leaders have to keep in mind that the goal is still to teach students, not to save money. Technology should be used as a tool to enhance instruction, not just to deliver instruction in a new way. Otherwise, when the novelty wears off, educators will be starting again from scratch in finding ways to effectively reach students.

Educators are just beginning to learn how to effectively use real-time performance data to better identify where individual students are at in mastering different concepts. In addition to helping teachers use this information to modify lesson plans and provide individualized attention, sharing it with students and their parents can be a useful way for them to track performance and possibly modify studying habits and routines.

The Gates’ Foundation’s Silent Epidemic report found that 71 percent of students felt that one of the keys to keeping students in school was to have better communication between parents and the school, along with increasing parental involvement in their children’s education. However, only 47 percent said their school contacted their parents or themselves when they were absent, and only 48 percent of schools made contact with parents when students dropped out.\(^{44}\) Having access to a wide variety of communication methods also means that schools can find ways to reach parents in a way that best suits them. Not all parents find notes home in the backpack, so visiting the school website may be the best way to get information about their student’s school and individual academic performance. Technology can help schools and teachers find ways to effectively communicate to parents whose work schedules prevent them from being reached during traditional school hours. For parents who aren’t able to take phone calls during a teacher’s break time, reaching them via email can open up entirely new lines of communication.

Examining all the ways technology can be used to personalize or otherwise improve instruction is beyond the scope of this report. The study group recommends a previous NASBE report, No Time to Wait: Creating Contemporary School Structures for All Students Today and Tomorrow, for more detailed information on technology-related improvements to teaching and learning, including:

- broadening instructional materials policies;
- supporting opportunities for students to learn outside the classroom through online classes, blended learning, and dual credit/dual enrollment programs;
- ensuring that technology is a 24/7 resource that helps students and educators connect to other communities of educators and learners, as well as to vast stores of resources and tools;
- using technology to provide real-time assessment and immediate support for student learning; and
implementing flexible, competency-based opportunities for students to accumulate credits outside of restrictive Carnegie Unit and seat time requirements.

More about this report is available at nasbe.org/study-group/structure-of-schools-2010/.

E. How Do We Get From Here to There

State board members and other education policymakers can use the guiding questions below to examine their current policies, and consider what gaps and opportunities exist related to ensuring that their schools are effectively using technology to enhance learning and prepare students to become responsible digital citizens.

✔ Are current policies based on a full understanding of how students currently learn?

✔ Does the board understand and has it addressed both digital literacy and digital citizenship?

✔ Do the state’s policies about behavioral issues effectively address those related to technology use?

✔ Are the state’s schools providing students with real-world experience with technology in a way that prepares them to be college and career ready? What policies need to be added or changed to make this happen?

✔ Are there state policies that hold students back from taking full advantage of technology-related learning opportunities? How can schools build on students’ interests and access while away from school, instead of letting capacity and resource limitations stunt this type of growth?

✔ Does the board have ways to incorporate the voice of students into policy discussions and decisions (e.g., student board members, student advisors, input from a statewide student council)?

✔ Do schools and teachers effectively use technology to communicate to parents and the community? What can the state and districts do to promote this communication?

Recommendations for Policymakers

1. Address digital citizenship and digital literacy. These are relatively new areas for education leaders to address through the creation of policies and programs. It is important for policymakers to realize that every school community is different and each is starting at a different place. Some will be ready to institute integrated curricula, while others first need to create common definitions. The study group recommends that state boards urge their districts and schools to address the critical areas of digital citizenship and digital literacy and ensure that the state education department is prepared to offer resources and guidance for these discussions.

2. Design instruction to take advantage of how each student learns now. It is time to revisit what “school” is and how education policymakers can ensure that their decisions create a learning environment that best fits current learners’ needs. Policies at the state and local levels should be responsive to student’s lifestyles and behaviors at home and in the classroom.

3. Create policies that allocate resources based on data, student needs, and student, parent and stakeholder voices. These key stakeholder groups understand the complexities of the issues involved, and can provide the most accurate feedback about what solutions might work best. Additionally, providing access to student performance data to parents and students can also help them serve as an informed partner in ensuring that student study habits, methods and schedules are most conducive to learning outside of school hours.
Ideally, we need school leaders who help communities think very carefully about what learning goals they have for their students, their faculty, and themselves, and then look at how technology tools can support those learning initiatives. It’s not about “using more tech” or even about “using technology to boost engagement,” since what is engagement without direction? The fundamental issue is how do we think about the kind of learning experiences that will prepare people for work, for our democracy, and for a well-lived life, and to what extent can technology support those kinds of learning experiences.

--Justin Reich

Technology and digital devices, when used ethically and responsibly, have the potential to be the great equalizers and connectors of our time. Studies show students’ use of digital devices and online access is booming, while the U.S. economy is relying on workers’ ability to manipulate complex data and devices to maintain productivity and contribute to the nation’s global economic position. But truly realizing the promise of technology in schools is dependent on the ability of educators—teachers, administrators, specialists, and support staff—to reinvent students’ learning experiences in ways that reflect and take advantage of the digital opportunities that are so much a part of 21st century life.

Unfortunately, the nation’s progress in ensuring our educators have the pedagogical training, technological tools, and flexible educational environments needed to provide high-quality digital learning has been mixed at best. Many educator preparation programs do not provide adequate focus on the teaching skills, dispositions, and strategies needed to thrive in a technology-rich school or reflect the digital learning environments we want to create in our K-12 classrooms. At the same time, professional learning for veteran teachers has too often not kept pace with advances in technology or new ways of learning, even as the number and quality of these training opportunities have fallen significantly due to budget cuts. Meanwhile, the turnover rate among new teachers—who are also among those most likely to be digital natives—remains very high: one-third leave within their first three years in the classroom, and almost 50 percent leave within their first five years, meaning that much of the training that does take place goes to waste. Finally, educators who want to be innovative about digital learning in an “anytime, anyplace” environment can find themselves stymied by policies and procedures that are not flexible enough to accommodate such strategies.

This chapter examines five key areas where state policies related to educators can make a difference in fostering digital learning:
• Today’s vision of a “connected educator”;
• Establishing the state’s vision for technology and education in standards;
• Improvements in educator preparation;
• Improvements in professional learning opportunities; and
• Increased flexibility around time, place, and pace for learning.

A. Vision of a “Connected Educator”

In 2010 the U.S. Department of Education released its blueprint for technology, The National Education Technology Plan. Among its recommendations, the plan calls for states and districts to “build the capacity of educators by enabling a shift to a model of connected teaching.” Connected teaching allows educators to have access to multiple sources of data and to have the tools, content, resources, and personnel available in a system “that empowers educators to create, manage, and assess engage and relevant learning experiences for students.” The study group viewed this concept as one of the pillars of 21st century instruction. One depiction the traditional teacher network versus the “networked teacher” is shown below.

Similarly, the Alliance for Excellent Education, one of the founding organizations of Digital Learning Day and the subsequent digital learning series, called for a learner-centered approach to education that has educational technology playing a key role. In its recent report Culture Shift: Teaching in a Learner-centered Environment Powered by Digital Learning, the authors stated in a learner centered environment “Educators are empowered to use innovative approaches and personalize learning in face-to-face, blended, or virtual environments...Technology and digital learning support this culture shift by providing tools, resources, data, and systems that increase teaching options and opportunities as well as promote efficiency.”

The study group members—emphasizing that the teacher and student must remain at the focus of instruction—viewed these concepts as the core of its vision for 21st century teaching and learning. To be successful, the study group said, both teachers and students must have:

• Access to high-quality material and data anytime and anyplace to enhance their learning;
• The skills and ability to decipher what data and information to use in their learning, as well as the methods to best accomplish their learning goals; and
• The content necessary to achieve high-quality learning for all.

In order to achieve this at scale and with fidelity, state and district education leaders need to ensure that both teachers and principals know how to build a learning community.

Source: Alec V. Couros, “Examining the Open Movement: Possibilities and Implications for Education” (Ph.D. diss., University of Regina, 2006), 172.
using technology to suit their needs, and that educators understand how to use technology and different media to personalize learning for their students. At the core of a digital learning community are three factors: a networked teacher, a networked administrator, and a collaborative partnership to establish the community outside the school’s physical and online boundaries.

**The Networked Educator**

A critical element of a “networked-teacher approach” is that teachers are at the center of the network and have the autonomy to foster students’ learning, as well as their own. For example, a teacher may devise an assignment in which students are engaged in a multi-week study of a topic. The students gather research online and through primary print documents, while blogging about their experiences and findings. The blogs can serve as an impetus for a larger research report to be presented as part of a school, district, or statewide competition or conference. Throughout this assignment, the teacher is collecting data on the students’ learning and growth in the subject. To enhance her practice, the teacher may connect with outside colleagues through online social forums to benchmark her progress and gather feedback to improve her instruction.

While this is just one example of networked instruction occurring in schools today, the reality, according to an NEA survey, is that only 32 percent of teachers report using technology in their daily instruction; only 37 percent of teachers report using technology to research and gather information; and just 40 percent of teachers report they use technology to monitor individual student progress. As a result, fewer than one classroom out of five sees students engaged in collaborative work around shared digital projects.52 Despite this low level of integrating technology into students’ learning and teachers’ instruction, 95 percent of teachers in the survey reported they believed technology improves student learning. This disparity could be the result of many factors: not enough professional development to support educators’ practice, minimal access to technology within the classroom and school, and the educational culture of the school and district. While more research on educators’ use of technology in their instruction is needed in order to fully understand how classroom practices in this area can be improved, the study group was also clear that state boards cannot sit idly by waiting for the results before moving forward.

**The Networked Administrator**

Research continues to prove that principals and administrative leaders are second to teachers in student success and academic growth.53 The turnover rate for principals mirrors that of teachers, roughly a third leave within the first three years and almost half within the first five years.54 This is critical because the turnover not only affects students’ learning, but also the ability to sustain integration of new ideas and pedagogical models—such as educational technology—into the school.55 Professional development and support such as mentoring is often lacking for new principals and frequently cited as a reason for leaving the profession. This is due to lack of opportunity and budget restraints, which occur despite research linking the importance of professional development for principals to improved student learning.56 In fact, it is as important for principals to network and connect with their colleagues in person and online as it is for teachers. Technology can enhance this practice by establishing an environment where principals can connect and receive real time feedback on their practice.

How technology is used within the school is equally important. A 2010 survey conducted by researchers at the
Richard W. Riley College of Education and Leadership at Walden University found that 92 percent of administrators reported they are “supportive” or “enthusiastically supportive” of new technology—but this is a disconnect from the 66 percent of teachers who said their administrator was supportive of their technology use in the classroom.57 When building a culture of flexible and supportive use in a learner- and teacher-centered culture, all parties in the school need to have a common understanding of acceptable use and flexibility in goals and pathways to student learning.58

B. Establishing the State’s Vision for Technology and Education in Standards

Standards are one of the principal ways school systems—state and local—establish their vision for education and make that vision usable for educators and students. When it came to technology, however, the standards that began emerging in the early 1990s were initially less about an educational vision and more about the skills needed to operate the hardware and use basic software. But these standards evolved rapidly, and by 2008, when ISTE unveiled its revised sets of technology standards for students (NETS•S) and teachers (NETS•T), they focused much more heavily on areas such as critical thinking, problem solving, communications, creativity, and research skills than on operating devices.59

States, too, have generally followed this trend. All states have technology standards for students, and nearly all have technology standards for teachers, and in most cases these have been aligned with or modeled after the ISTE standards. However, nearly one-third of states lack technology standards for administrators,60 and as the role of technology in education has evolved, there are now a number of other areas where state technology standards may be useful, such as requirements for endorsements for various types of staff or guidelines for courses or other programs. Some of these areas are discussed below.

Standards for School-based Technology Coaches

Technology coaches generally operate within one school, “providing ‘just in time,’ imbedded, and ongoing professional development for teachers, staff, and administration.”61 The coach’s primary focus is to help classroom teachers integrate multiple technologies and 21st century skills into their practice, hone specific strategies, and identify and/or develop new resources and materials in a variety of media.62 Coaches, who have generally been (and sometimes still are) classroom teachers, are intended to

### Key Elements of ISTE Model Standards for Technology Coaches

1. Visionary Leadership: Technology Coaches inspire and participate in the development and implementation of a shared vision for the comprehensive integration of technology to promote excellence and support transformational change throughout the instructional environment.

2. Teaching, Learning, & Assessments: Technology Coaches assist teachers in using technology effectively for assessing student learning, differentiating instruction, and providing rigorous, relevant, and engaging learning experiences for all students.

3. Digital Age Learning Environments: Technology coaches create and support effective digital-age learning environments to maximize the learning of all students.

4. Professional Development & Program Evaluation: Technology coaches conduct needs assessments, develop technology-related professional learning programs, and evaluate the impact on instructional practice and student learning.


6. Content Knowledge and Professional Growth: Technology coaches demonstrate professional knowledge, skills, and dispositions in content, pedagogical, and technological areas as well as adult learning and leadership and are continuously deepening their knowledge and expertise.

form collegial or mentoring relationships with staff (rather than serving as “technology monitors”) and help teachers become part of an online connected educational community, aligned with the study group’s vision for networked educators discussed above. The close-to-real-time support is especially valuable for rural and inner city districts where such support opportunities are often limited.

Despite reports of success with technology coaches, many of these positions are among the first to be cut in times of budget shortfalls. Still, there are a number of large-scale initiatives supporting such coaches and mentors, including Pennsylvania’s Classroom for the Future (initially funded for 2006-07 and still going strong), which not only seeks to place a technology coach in every high school, but supports these coaches through regionally based Technology Integration Mentors. In addition, ISTE has now developed model standards for technology coaches, the NETS•C, which could be used at the state or district level (see textbox on page 26 for more details).

**Virtual Teachers, Courses, and Schools**

Perhaps no aspect of educational technology deserves the “wild, wild West” description more than the area that includes online classes, schools, and teachers. Forty states now have virtual schools or plans to open them, four states and many districts require students to take an online class in order to graduate, and blended classes are popping up everywhere. Among the many questions being asked is how policymakers can ensure the quality of the teachers working in a virtual setting.

As noted above, one of the problems for both policymakers and educators is that because the field of online instruction is so new, there is as yet relatively little research into what constitutes best practices for virtual K-12 schooling, making it more difficult to write standards everyone can agree on or develop classes for preservice or professional learning. As one university official put it, “The demand [for courses in online instruction] from preservice teachers is growing...[but] there isn’t a specific set of strategies developed yet, so we’re making it up as we go along.”

At the same time, there is not agreement yet on the course of action states should take in terms of online credentials for teachers or how certification should work across state lines. As Phillip Rogers, the executive director of the National Association of State Directors of Teacher Education and Certification says, “We certainly can’t ignore that this is going on across all our borders, and there’s a lot of interest at the state level about it, but the conversations are all over the place right now.” Six states have online endorsements for teachers (GA, ID, LA, MI, SC, and UT), but these are all voluntary and differ considerably from each other. Meanwhile, only another handful of states have reciprocity for virtual teachers who are certified in other states. Given the cross-border nature of virtual schools, some believe it makes sense to create a national certification program for educational technology and curriculum development that transcends state lines. In 2010 an alliance of nonprofit organizations, education agencies, and universities founded Leading Edge Certification, which aims to create certifications in five areas (online and blended teacher, administrator, classroom teacher, teacher librarian, and leading educator or professional developer) by 2015, with the online and blended teacher and administrator certificates already in place.

Others believe that the rapid growth of different blended teaching models as well as stand-alone virtual classes means that in the long run all teachers should have the necessary skills and strategies for effective online instruction in their toolboxes. As Susan Patrick, president and CEO of the International Association for K-12 Online Learning (iNACOL) points out, “We need to get out there more and help [colleges of education] understand that there’s just no reason new teachers coming out of these programs should be without these skills.” Clearly, this has implications for both preservice programs and state policy. To provide guidance for those developing preservice, professional learning, and educator evaluation programs around virtual teaching, iNACOL produced a set of National Standards for Quality Online Teaching (revised October 2011). The standards are available at www.inacol.org/research/nationalstandards/iNACOL_TeachingStandardsv2.pdf.

In a related area, policymakers and school officials are also concerned about the challenges of tracking the quality of online courses and schools overall. Several recent reports and news articles critical of virtual schools have roiled the online community and led to a series of charges and counter-charges between virtual school advocates and self-styled “watchdogs” around issues such as the rigor of online courses, high student turnover at virtual schools, virtual school finances, and ensuring that students are actually the ones doing their work and other accountability issues.

As with its online teaching standards, in October 2011 iNACOL also released its revised National Standards for Quality Online Courses. Some states have also taken action. For example, the Texas Virtual School Network (T-
VSN), which partnered with iNACOL on its most recent standards for online courses, solicits electronic courses from school districts for review and uses a cadre of trained reviewers to determine if the online courses meet the quality standards established by the state. All regular public and charter schools must use TXVSN-approved courses for their virtual offerings. California, Ohio, Georgia, Idaho, and Washington also have such clearinghouses, with differing levels of authority. But online advocates such as iNACOL also recommend that states and districts “focus [accountability measures] on outcomes based on student learning (increasing proficiency, student growth, closing the achievement gap, graduation, college and career readiness)” rather than just the “inputs” of state-certified courses, materials, and instructors.

**School Leaders**

While technology standards for students and teachers are frequently discussed, school leaders are less commonly included in this context, and as noted above, approximately one-third of states still lack technology standards for administrators. Yet there is no doubt about the importance of the principal’s technology leadership in truly changing the educational culture of a school. Without a sustained vision and mission, technology initiatives can easily lose momentum and bring the school back to an “everyone on their own” environment.

The third challenge is that school leaders are already notoriously burdened by responsibilities, with little time for professional learning in general, let alone around technology. Time is likely to become even more precious as states and districts roll out ambitious new teacher evaluation plans, many of which call for principals to make multiple observations of teachers’ work.

Experts point to two strategies that can help mitigate these challenges. The first follows the vision for the “networked administrator” discussed at the beginning of this chapter. Peer collaboration and peer learning communities are often cited as important elements of professional development for principals—but in practice these activities are often limited by lack of funding, lack of organized opportunities, or lack of time on the part of principals. Virtual connections, however, offer ways around all of these barriers, allowing principals to discuss the issues most relevant to them with peers from around the world, become inspired, gain insights from experts, and learn about the best resources, all the while honing their own virtual skills and strategies and doing so in ways that fit their schedules. Many such sites have been popping up, including one called “Connected Principals” (go to connectedprincipals.com to sample this resource).

The second strategy, following the lead of fostering technology skills in students, teachers, and coaches, is ensuring the state’s vision for school leaders reaches all levels of the system through standards. As in the other categories, ISTE has created model educational technology standards for administrators, NETS•A.

Several challenges exist, however, in bringing a tech-savvy leader to every school. One is the high rate of turnover among building administrators. Another is that unlike teachers, where there is a fast-growing number of digital natives, the average age of principals is close to 50, with only 12 percent being 40 or younger. This means most principals learned the ropes in environments that were not technology rich.

**C. Improvements in Educator Preparation**

Research examining the preparedness of teachers reveals that many preparation programs continue to focus and emphasize pedagogical theory and practices rather than demand extensive experience in a clinical environment and robust methods to teach the fundamental skills. The emphasis on pedagogical theory often remains even when technology is being introduced or emphasized in preparation programs. Further research probing the issue of technology use shows that much of the research is based on case studies and rarely provides evaluative and comprehensive study of the best approaches that are most effective for preparing pre-service teachers using technology.

**How Serious Is the Problem**

The Walden study released at an ISTE event in 2010 found that teachers who received their initial certification since 2000 did not feel prepared to incorporate technology or 21st century skills into their instructional methods. Alarmingly, only 60 percent of the educators who received advanced certification in educational technology felt prepared to incorporate those skills into their pedagogical strategy. While this is an improvement, it is still little more than half, and that is only of the teachers who self-selected or were chosen to pursue advanced certification in technology.

Surprisingly, given that the vast majority of those entering the profession are digital natives, new teachers are no more likely to integrate technology into their practice.
10 Things School Leaders Do to Kill a Teacher’s Enthusiasm for Technology

The following excerpts from “The 21st Century Principal,” a blog by school administrator J. Robinson, provide just one example of the countless blogs and other resources administrators can connect to online as they seek to reflect on and improve their practice.

1. Mandate the use of technologies or specific programs. One of the fastest ways to kill an educator’s enthusiasm for infusing technology is mandate a specific technology or specific program. We all have specific needs, tastes and desires, and a program that satisfies mine will not necessarily satisfy the next educators....

2. Use inadequate, faulty or overzealous web filtering systems that block sites teachers want to use. While school districts are obligated under CIPA and common sense to provide some level of protection for young students, a filtering system is inadequate or faulty when it dictates what teachers can and can’t do with the technology....

3. Provide inadequate or sloppy tech support systems. While teachers should always have plan B, even without technologically enhanced lessons, they should not have to have a plan b, a plan c, and even a plan d. If a school district has such shoddy tech support systems that using technology is like running an obstacle course, then expect your teachers to lose enthusiasm for using technology....

4. Provide inadequate funding....

5. Fail to provide adequate hardware and/or software. I’ve seen so many examples of this over the years. Teachers are encouraged to get students writing and engaging in online blogging, but they don’t have access to computers. Another example is even more ludicrous; students being asked to create 21st century projects yet they aren’t given anything but 20th century tools such a colored pencils and construction paper....

6. Purchase hardware or software after a sales pitch rather considering staff needs....Administrators should always bring in the end users when making these purchase considerations. School leaders would do well to remember that sales pitches don’t always translate into effective classroom implementation when it comes to technology sales presentations too!

7. Fail to be enthusiastic about technology use themselves....

8. Refuse to use technology yourself. This is related to number 7, but involves a total rejection by the school leader to use technology. You can’t be a 21st century leader by refusing to be a tech consumer yourself. Your refusal to engage in its use demonstrates what you really feel about technology. School leaders shouldn’t complain that their teachers fail to use technology innovatively when they keep sending out paper memos.

9. Fail to provide training and additional resources needed for tech implementation....

10. Use test scores as the only measure of successful technology implementation....Everything we do and do well cannot be connected to a “higher test score.” Test scores provide valuable information but they are not the only measure of effectiveness. School leaders who always want to know, “Will it increase test scores” aren’t really interested in successful technology infusion and tech implementation anyway. Their focus is pretty obvious.

Source: the21stcenturyprincipal.blogspot.com.
than their veteran peers. The research indicates that it is not lack of access, but primarily lack of knowledge and practice integrating the technology into their instructional pedagogy. Don Knezek, CEO of ISTE, said this finding is supported by his own experience in talking with school administrators. Administrators tell him “they don’t have to convince new teachers to check their e-mail anymore,” Knezek said—but they’re still not integrating technology any more frequently into their instruction. There could be two reasons for this, Knezek added: Either they are coming out of teacher preparation programs unprepared to integrate technology effectively, or they’re entering a school environment where they’re not encouraged to do so.80

Researchers from Indiana University conducted a study investigating the “types and content of technology experiences U.S. teacher preparation programs offer teachers in training,” The authors conducted a review of 68 studies covering technology use and strategies to prepare teachers to use technology, and then performed their own survey of school of education faculty and students across the country. The findings in their report highlight the uses of technology incorporation among colleges of education currently and reveal critical areas of concern for state education leaders. Following are some of the findings:

- Eighty percent of respondents indicated that all or some of the programs required a stand-alone education technology course as opposed to integrating technology use and pedagogy throughout the program and clinical experience;

- Personal productivity (e.g., word processing and spreadsheets) and information presentation (PowerPoint presentations and video creation) were the most commonly reported topics taught in programs (78 percent and 75 percent use reported respectively);

- Less than 25 percent of educational technology faculty reported teaching how to use technology to analyze student achievement data;

- A third of respondents reported that using technology to support curricular goals was the most important topic to address throughout methods courses; and

- Only 5 percent of respondents reported the use of technology to meet the needs of diverse learners as the most important topic in the program.81

While word processing and information presentation can be critical to reach students, it is equally important for teacher candidates to know how to collect, analyze and utilize data in their instruction to reach students at all their levels and educational needs. This will become particularly critical with the advent of new assessments.

The study also highlighted the strong connection between education school faculty modeling technology use in content and methods courses and the production of graduates who can integrate technology into their own teaching and learning.82 Many school of education faculty, however, “fail to provide appropriate modeling, as they themselves struggle with keeping up with the best practices in current technologies.”83 Finding clinical settings where educator candidates can use technology and apply their knowledge in the classroom with skilled facilitators and mentors is also a challenge, as the advisor’s own skill levels vary, thus possibly contributing to the unpreparedness of the new educator’s use of technology.84 Such obstacles can be further exacerbated given the uneven distribution of approaches schools and districts take to reach their students and incorporate multiple teaching methods into the instruction. This may make it difficult for districts and colleges of education to engage with each other if there is no common vision to engage on or even common access to materials and technological resources. Nevertheless, if teachers and administrators are going to be prepared to use technology and different media tools to teach and to support each other’s teaching in innovative ways, it is important to ensure that pathways into the education profession are aligned with the state’s vision and adequately prepare our educators.

This is particularly crucial with the pending full-scale implementation of college- and career-ready standards and next generation assessments. The Common Core State Standards require, for example, students to be able to use technology, the Internet, and multimedia devices in order to solve difficult and complex problems in math as well as fiction and nonfiction texts. The Next Generation Science Standards and states’ move to online learning platforms also require teachers to have a fundamental understanding of technology.

Additionally, the next generation tests being developed by the assessment consortia will be able to provide teachers with in-depth and complex data to track where student’s are on a given subject through the use of summative, formative, and benchmark assessments. While some educators have the skills to use this data and the full support of their schools, many do not, and educators continue to enter the profession without the skills needed to differentiate and personalize learning experiences for their stu-
students. To provide rich data to a teacher who lacks the deep understanding needed to translate data into actionable instruction and has little support to back this up is a missed opportunity to strengthen instructional and measurement time. It is critical to incorporate these skills into preservice and inservice sessions to ensure that teachers know how to use data and data tools to best support their needs.

What’s Being Done, What Can States Do?

While evaluative research providing a comprehensive view of effective preparation approaches is preliminary, effective strategies are emerging. States’ use of separate certifications and endorsements for educators to teach online or have a specialty in technology, as highlighted in the previous section, can stimulate preparation institutions to create programs and align their pathways to producing effective, 21st century teachers. Some universities have incorporated their own one-to-one laptop initiatives for students and provided technology training for college faculty, including using data to target instruction and creating portfolios demonstrating students’ comprehension and abilities.

Other universities have used video conferencing and online connection software such as Skype, FaceTime, and other satellite-based programs to connect with educators and classrooms worldwide. This includes observing other classrooms and educators’ teaching methods, as well as providing opportunities to build a global community around best practices in education. As implementation and roll out of college- and career-ready standards and assessments come to fruition, states can encourage higher education faculty to attend the professional learning sessions and seminars on technology use around the standards to increase their own understanding and ability to teach candidates the necessary skills.

A group of 26 states and 140 teacher education program have formed the Teacher Performance Assessment Consortium to find new ways to evaluate teacher competency and effectiveness. The consortium’s primary method of evaluating teacher candidates’ effectiveness is through the use of portfolios, including videos and comprehensive multimedia documentation of candidates’ ability to be effective in the classroom. The consortium has produced overwhelmingly positive results and could become the foundation for how institutions of higher education produce evidence of a candidate’s preparedness to teach. The videos and media contribute to the ability of teachers candidates to reflect on their own practice and that of others, as well as to network with other candidates. The initial findings and results are showing that this evaluation process is significantly contributing to a candidate’s effectiveness by providing the teacher with the necessary skills to reach all learners and improve their practice.

The use of video technology and software is becoming more prevalent in classrooms, and shows significant promise in helping improve educators’ practice and delivery. Teachers who become National Board Certified Educators must provide several hours of video tape of their practice and links to student growth and improvement. Research documenting this process demonstrates that teachers who are national board certified have positive effects on student growth. The Measures of Effective Teaching project also demonstrates that teachers who use video software to document their instructional practice and reflect on their practice show gains on student growth.

While a majority of this research is preliminary, the results show promise for providing teachers with a visual representation of what good instructional practice looks like and how to best change their instructional methods to mirror effective practice. States can incentivize these efforts or incorporate some of the lessons learned into their requirements for licensure and recertification.

D. Technology and Job-Embedded Professional Learning

“One challenge is that most teacher professional development is prescribed, top-down, low quality.”

— Justin Reich

Much has been made of the data that tell us how the number of Generation Y teachers (individuals born roughly between 1977 and 1995) has “more than doubled in proportion since 2004...and are projected to make up nearly half of the workforce by 2020.”
element that makes this unique, of course, is technology—the majority of Gen Y teachers grew up using the Internet and technology. Given this simple fact, it would seem to be only a matter of time—perhaps even a relatively short amount of time—before a cohort of tech-savvy, actively tweeting, social media-integrating teachers take over our schools. The reality, however, is more complicated. For one thing, being born at this time did not necessarily mean being born into a world of social media and alternative forms of communication. Nor did it necessarily mean being educated in a technology-rich learning environment. One result of all this, as noted earlier, is that newer teachers aren’t any more likely to incorporate technology into their instruction than their veteran peers.

However, the study cited above did find that many Generation Y teachers actively seek workplaces that use technology to support their instructional practice and ability to collaborate with their peers. This is important for policymakers and school leaders to keep in mind for several reasons. First, opportunities for collaboration and sharing best practices and challenges are often cited as incentives for staying in the school system and teaching profession. The 2009 Metlife Survey of the American Teacher found that teachers who are very satisfied with their careers are more likely to work in schools with higher levels of collaboration. Likewise, school environments in which teachers are primarily teaching in isolation are more likely to leave the profession. Clearly a collaborative learning community in schools is needed to reduce turnover and help keep teachers in the classroom.

The second point is more directly related to technology as an integral part of building a collaborative community for professional learning. The 2009 Metlife survey found that teachers “spend an average of 93 percent of their official workday working in isolation from their colleagues, and more if one counts the hours of preparation and grading spent after school hours.” The study group reasoned that if policymakers expect students to develop 21st century skills—which include collaborating with their peers shouldn’t the same be expected of our teachers? Collaboration among teachers not only improves their practice, it also provides an opportunity for teachers to model collaborative learning for their students.

Technology can be used to facilitate professional learning by establishing collaborative communities of practice within a school, across district and state lines, and even globally. Online courses allow educators to expand their knowledge of research-based practices while online, and virtual communities eliminate time as well as geographic restrictions and allow teachers to share their intellectual abilities and benchmark their practice with their colleagues. Video and audio recording allow teachers to record their lessons and instructional practice and share with their peers. This can be both a demonstration of effective teaching and provide the opportunity to receive additional coaching if desired.

Many districts have created forms of professional learning communities or learning teams as a strategy to foster collaborative practice. While research has shown this as a successful method, technology can expand the reach of such communities as well as help free participants from time constraints. For example, in small districts where there might be only one subject or grade level teacher per school, as well as in large rural areas where travel is a challenge, providing an online social collaborative portal gives teachers the opportunity to connect with their colleagues. Alaska developed the Alaska Statewide Mentor Project in response to the high attrition rate of teachers—as high as 85 percent in some schools—and to attract teachers to the

---

**New Standards Create Opportunities for Professional Learning**

The pending implementation of college- and career-ready standards and next generation assessments call for different instructional methodologies that more heavily incorporate critical and creative thinking, problem solving, research and inquiry skills, and personalization of knowledge and skills. These fundamental changes require that teachers receive extensive, high-quality and continuous professional learning occurring in teams of colleagues that is linked closely to classroom instruction. State boards of education, regardless of their policy and rule-making authority, “are positioned to leverage professional learning as a strategy for improving results for educators and students, while guiding the state department of education, local school districts, third-party providers, institutions of higher education, and other key stakeholders” towards successful implementation resulting in student growth.

state’s most remote areas, which are often “isolated from each other and off the road system, accessible only by air, boat, dog sled, or all-terrain vehicle.” The mission of the project is to “give new teachers the support they need to succeed.”

Within this model, mentor teachers receive ongoing professional development through eight week-long mentor academies over a two-year period. Each mentor works with approximately 15 teachers who are in their first or second year of teaching. Since the beginner teachers are located throughout the state, teachers and mentors communicate weekly through phone, email or Skype. Mentor teachers also visit the teachers monthly often traveling by “small planes, skiffs, skidoos, and dog sleds” to ensure personal face-to-face connection with the village school and new teacher. Throughout the program, beginner and mentor teachers work together to create and analyze multiple means of formative data, reflect on the classroom practice, and measure student and teacher growth. All of these measures are aligned and benchmarked to the professional teaching standards and the state’s standards. Aggregate data collected over five years showed that 94 percent of teachers who went through the program were still teaching and the average retention rate of teachers within districts rose to 79 percent.

Kentucky, which also has a significant number of small and rural districts in addition to its urban areas, is building an online data system with a collaborative component called the Kentucky Continuous Instructional Improvement System (CIITS). Within this portal, which is only open to Kentucky educators and not the general public, teachers have access to lesson plans, multi-media resources, thousands of research-based videos created by teachers and providers, and formative item test banks, each of which are aligned to the Common Core and rigorously vetted by Kentucky teachers. See the textbox above for more information on CIIT.

In looking at the Alaska and Kentucky models, it is important to remember that educators can feel isolated no matter where—rural, urban, or suburban—their schools are located, and the initiatives recounted here provide examples of how technology can be used to create opportunities for educators to connect, collaborate, and create data to inform their instruction. All of these elements are linked to student success and educator effectiveness.
What States Can Do?

The study group believes state boards of education can and should contribute to building an infrastructure for continuous and high quality professional learning for our educators, of which technology can play a part. Steps boards can take include the following:

- Define, implement, and monitor effective professional learning;
- Build alignment and coherence between professional learning and the state’s priorities and goals for its content and education standards;
- Engage with the state education agency, governor’s office and legislature to ensure adequate funding and flexibility for pathways and programs for professional learning;
- Build statewide stakeholder and public support and engagement;
- Fund a cadre of coaches who can serve as educator effectiveness and technology experts;
- Incorporate opportunities to collaborate virtually into the states mentorship and induction process;
- Work with the state education agency and districts to develop a longitudinal database system with access to formative and summative data for students; and
- Incorporate technology and digital literacy into educators trainings on Common Core standards.

To create a connected educator, the system must provide the opportunities and choices for teachers to foster their learning community.

E) Increased Flexibility Around Time, Place, and Pace for Learning

For educators, time in the school day is considered a luxury. Too often, teachers express their desire to have more time to cover content in depth and connect with their colleagues through collaborative practice to share ideas and challenges or celebrations regarding their students. The current structure of the school day, or even calendar year, provides minimal flexibility for teachers to engage with their colleagues and to allow sufficient time to dive deeply into the new curriculum. For students, time is necessary in order to absorb the content and apply newly learned skills. Unfortunately, time is also a constraint given that many schools require students to “power down” and turn off their devices as soon as they walk into the school building. The members of four recent NASBE study groups have affirmed the belief that it is important to “celebrate learning as a 24/7 endeavor that cuts across time and space.” Mobile devices, tablets, and other electronic and paper means allow students to have access to information at their fingertips with minimal barriers. Ignoring the cultural shift and “mindset of students who grew up with the Internet, ignores current pedagogical research and thinking, and wastes significant opportunities to enrich education for all students.”

States and local schools have begun to make this shift by expanding and changing the structure of time to allow for expanded learning. New Hampshire was one of the first states to remove Carnegie units and switch to a competency-based system. As a result, students can graduate from high school based on mastery of content regardless of the traditional seat time and credit-based completion. This extends beyond online flexibility to students participating in outside extracurricular activities or programs, allowing for additional flexibility for students to demonstrate mastery and ability of knowledge and skills. Iowa and other states are considering similar initiatives and exploring the elimination of seat time and credit-based courses and switching to a mastery-based component. Increasing flexibility in these ways allows teachers to have more time to cover information in depth rather than having to cover the content at the same pace, which may be unfit for some of the learners. This is critical, as the content of the college- and career-ready standards adopted by states are in general significantly more rigorous than previous standards. Therefore, allowing teachers the flexibility of time and pace to deliver student knowledge and mastery of skills is crucial for the success of the initiatives.

Local schools and districts are experimenting with time before and after school as ways to maximize learning. Rural schools in New Mexico for example, are using bus time for students to listen to podcasts of classes or topics of interest related to their studies. Similarly, a program housed in Vanderbilt University titled Aspirnaut provides extensive STEM education to students in rural areas by outfitting school buses with wi-fi and supplying students with differentiated devices outfitted with apps, podcasts, and lessons tied to their instructions. Older students then participate in lab programs through Skype or other video conferencing with educators and students in other states creating a collaborative environment not generally available to those in less populated areas.
These changes have profound implications for educators as their role shifts from the traditional deliverer of information to being a facilitator of knowledge. If the Internet can quickly provide information such as dates and facts, time spent on memorization can be reduced while time spent learning deeper concepts or skills such as how to conduct research can be increased. Teachers also have more time to target individual instruction to students by helping students who are struggling or pushing students who have mastered content to the next level.

Flexible time and place also allow educators to engage with each other, which is critical for teachers—and subsequently students—growth. The days when teachers go into their classroom and shut the door are over. A Teacher Ambassador Fellow to the U.S. Department Education told a 2011 NASBE study group how her colleagues in the English department met to create their own assessments as tools for collecting data on student progress, created shared and aligned lessons and then observed each other’s lessons to ensure fidelity and offer support to their peers. The teachers called this some of the best professional development they have ever been part of and said it significantly improved their effectiveness and ultimately their students’ success. 105 Crucial to the effectiveness of this approach was flexibility in the schedule for the educators to meet and collaborate. Rather than the traditional method of afterschool collaboration, which often extends past contract hours, the teachers had common time built into the school day to build these resources and shared practices. As technology tools are considered for students, it is important to consider the educator’s perspective and how these methods and strategies can be used to enhance their ability to work with each other and improve their practice.

Questions for State Boards to Consider

• How are educators, administrators, and other support personnel incorporated into the state’s plan for education technology?

• Are the current state educator standards, licensing requirements, and preparation program accreditation policies aligned with the state’s vision for incorporating technology and digital media into education?

• To what extent are educator effectiveness and teacher/student technology use incorporated into the state’s requirements and policies for educator evaluations, technology standards, and educator professional learning systems?

• Are teachers certified in another state able to teach students who reside in your state through online and virtual means? What are the funding, infrastructure, and cultural barriers to this pathway?

• Does the state prohibit student and educator access to high-quality content through online courses based on geography, such as district, county, or state?

• Does the state require digital content and online and blended learning courses to be aligned with college- and career-ready standards, such as the Common Core standards?

• What barriers exist that make it more difficult for teachers within and across districts to collaborate with each other on shared practices? Does the state’s system for professional learning and certification requirements extend to teaching online and virtual courses.

Recommendations for Personnel and Educators

1. State boards of education in collaboration, with the state education agency, state technology officer and relevant stakeholders, should create a statement, definition, or visionary document the defines what a connected and networked educator looks like within the state.

2. State boards of education, in collaboration with relevant stakeholders, should examine what opportunities, incentives, and barriers are in place that inhibit or enhance the ability of districts to partner with each other, or across state lines, to share resources.

3. State boards of education should examine the policies in place that allow or inhibit the ability for online, virtual, and blended learning opportunities for students and teachers.

4. State boards of education should reexamine the school weekly and yearly calendar to allow districts and schools autonomy to create a schedule allowing additional flexibility and time for students to learn through alternative means and for educators to connect with their colleagues.

5. State boards of education, in collaboration with licensing boards and program accreditation committees, should ensure that teacher candidates have the
fundamental skills and content knowledge to teach students in a 21st century environment and are able to use student data to personalize instruction.

6. State boards of education should ensure that teacher candidates, no matter their path to the profession, have robust clinical experiences where technology and online learning is incorporated into the program.

7. States, districts, and schools should expand professional learning experiences to include online and virtual learning.

8. In collaboration with districts and the state education agency, state boards should ensure that teachers are provided with high-quality professional learning and mentorship opportunities embedded throughout the school day through technology. Steps to ensure this include:

- Defining, implementing, and monitoring effective professional learning;

- Engaging with the state education agency, governor’s office, and legislature to ensure adequate funding and flexibility for pathways and programs for professional learning;

- Funding a cadre of coaches who can serve as educator effectiveness experts and technology experts;

- Incorporating opportunities to collaborate virtually in the state’s mentorship and induction process; and

- Incorporating technology and digital literacy into educators’ trainings on Common Core standards.
Technology in the classroom is nothing new. Classrooms across the country have experienced varying degrees of integration with a number of technologies to facilitate learning over the years. In the mid-1900s, it was mimeograph machines and overhead projectors. In the 1990s, states, districts, and schools worked to ensure all classrooms had a computer and that teachers knew how to use it. A decade later, states worked to ensure these computers were connected to the Internet and that teachers could use them as part of their instruction. Moving forward, however, technology integration in the classroom will need to mean more than a new tool for teaching students in the same old ways. Meaningful technology integration in the classroom has the ability to transform and personalize learning for all students. To achieve this vision, however, thoughtful planning and implementation of a robust education technology infrastructure is a must. An up-to-date education technology plan that proactively tries to anticipate the technology needs of schools in the state will need to be a vital component of education policy. The ability for a state to develop this vibrant and effective education technology infrastructure will play a significant factor in being able to connect and engage with students through technology in the ways that benefit their learning and via media they prefer.

Without considering the kind of technology infrastructure needed to effectively implement new technologies into schools, even the best state-level education visions for technology will fall short because there might not be an infrastructure to support it. This chapter provides the current context regarding education technology infrastructure and some of the major issues state boards of education will likely face when developing a robust infrastructure for current use while at the same time preparing for technologies of the future. In particular, this chapter covers the following education technology infrastructure issues: identifying the current capacity of states to effectively and equitably integrate technology in meaningful ways; developing data systems that provide timely, meaningful information to stakeholders, educators, and policymakers alike; navigating the transition to digital instructional materials; and supporting blended and online learning opportunities.

A. Access and Equity in Technology Infrastructure

The state of education technology infrastructure can vary immensely both across and within states. Providing all students with reliable, connected digital devices that can deliver high-quality content still challenges all states across the country. Researchers estimate that all public schools have at least one instructional computer with Internet access and the average ratio of students to instructional computers is approximately 3.1 to 1. In 2009, Maine led the nation by being the first state to implement a 1-to-1 laptop initiative for all its high school students. With the reduced costs of hardware each year, more and more states will likely find new ways to get digital devices into the hands of students so this technology can benefit learning.
However, the acquisition of hardware is not the only infrastructure issue challenging districts’ and schools ability to effectively integrate technology into classrooms. The every-increasing need for bandwidth also challenges the education technology infrastructure of states and districts. The use of digital instructional materials, software, apps, and social media in meaningful and significant ways all require varying levels of bandwidth to work effectively and seamlessly. More than ever, bandwidth is the number one limiting factor for schools that attempt to use engaging educational content and communications through the web. Almost 80 percent of schools that receive Federal E-Rate funding for computing say their Internet connection does not fully meet their needs. Over 90 percent of K-12 schools directly or indirectly connect to the Internet via the partnership’s high-speed network that links all colleges and universities in the state at no cost.

To address these issues, a number of states, including Maine and Utah, have formed public partnerships with various departments and organizations to develop cost-effective broadband connections for schools across the entire state. For example, NetworkMaine is a consortium of the state department of education, library, office of information technology, and university system dedicated to providing broadband connectivity to over 900 schools and libraries in the state at no cost. In Utah, a partnership among education institutions and local telecommunications providers is helping connect the entire state. Almost 90 percent of K-12 schools directly or indirectly connect to the Internet via the partnership’s high-speed network that links all colleges and universities in the state. These partnerships illustrate the collective capacity of public organizations to create the kind of education technology infrastructure necessary to connect students to immersive digital content that can assist in their learning.

The chart on page 39 provides some common Internet activities that support student learning and the amount of bandwidth needed per user to seamlessly interact with...
these activities. While it might be beyond a state board of education’s authority to set bandwidth recommendations, it is important to keep these bandwidth numbers in mind when the state is developing a vision and strategy for how to use technology in education. If the vision is to provide immersive digital content that streams high quality video, there could be a disconnect between the state’s vision and the amount of bandwidth available in schools and communities to fully realize the benefits.

Additionally, the State Education Technology Directors Association (SEDTA) notes that out-of-school access to broadband is a key factor in making education available anytime, anyplace, anywhere for students. Broadband use across the country has hovered around 65 percent of households for the last few years. While almost 90 percent of households with greater than $50,000 income report having access to a computer or the Internet, less than 66 percent of households under that income level report the same.

States need to consider and address penetration of technology in various communities as they move forward with statewide education technology initiatives. Because schools provide more and more educational resources through digital means in an on-demand fashion, it is imperative that all students have the ability to access these resources once they leave the school building. As states consider building a robust education technology infrastructure, innovative uses of E-Rate funding could help increase access to the Internet for the community.

Identifying the Current Capacity of States to Integrate Technology

As was discussed in the educators chapter of this report, effective integration of technology takes more than just a device for a student and a connection to the Internet. There must also be a strategy for how teachers and students interact with these technologies and provide appropriate time and training to ensure they are used in ways that maximize learning. However, for some schools in various parts of the country, there is not sufficient education technology infrastructure to even begin having a conversation about effective uses of technology in the classroom. While there are great potential benefits of meaningful technology integration into the classroom, it is important that each state have an accurate assessment of the kinds of technologies being used in districts and schools across a state.

To begin answering these questions, both of the main Common Core assessment consortia, Smarter Balanced and the Partnership for Assessment of Readiness for College and Careers (PARCC), are providing a technology readiness tool for participating states to determine their ability to provide the online assessments being developed. Results from the initial state surveys will be available in the fall of 2012, which will help evaluate where states are regarding technology and infrastructure. However, while these evaluations will be a good start to determine technology capabilities within a state, these surveys will only be focused on a school’s ability to administer the consortium assessments. Education tech-

---

### Bandwidth Usage for Common Internet Activities that Support Student Learning Per User

<table>
<thead>
<tr>
<th>Activity</th>
<th>Bandwidth (Mbps)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Email and Internet Browsing</td>
<td>500 Kbps</td>
</tr>
<tr>
<td>Online Learning</td>
<td>250 Kbps</td>
</tr>
<tr>
<td>HD Video Streaming</td>
<td>4 Mbps</td>
</tr>
<tr>
<td>Video Chat for 7 or more People</td>
<td>8 Mbps</td>
</tr>
<tr>
<td>Current Generation Standardized Multiple-Choice Online Assessments</td>
<td>64 Kbps/student</td>
</tr>
<tr>
<td>Common Core Consortia Assessments</td>
<td>TBD, but almost certainly greater than 64 Kbps/student</td>
</tr>
</tbody>
</table>

Source: Adapted from Christine Fox, John Waters, Geoff Fletcher, and Douglas Levin, *The Broadband Imperative: Recommendations to Address K-12 Education Infrastructure Needs* (State Educational Technology Directors Association, Washington, DC, 2012), 21.
Bring Your Own Device (BYOD): Opportunities and Challenges

As today’s economy continues to strain education budgets, some districts and schools are looking into developing policies that permit students to “bring your own device” (BYOD) for use in schools for educational purposes. Ideally, BYOD could allow all students to interact with a digital device at close to a 1-to-1 level while limiting capital expenditures by schools and districts. For example, Forsyth County Schools in Georgia now has all schools participating in a BYOD program. To accommodate the program and additional devices, the district more than doubled its Internet speeds. However, BYOD is far from widespread practice — 65 percent of principals in the latest national Speak Up survey indicated they were unlikely to implement a BYOD policy for instruction in this school year. But as more states and districts consider BYOD, the following are some issues to consider as policymakers go from discussions to possible policy change:

- **Equity and Access** – Perhaps the most significant consideration for BYOD is figuring out access to devices for those who cannot afford them. While over 60 percent of parents in the Speak Up survey indicated they would purchase a device for their student to use in school if it were allowed, there are almost as many parents who are unwilling or unable to provide such a device. How would schools provide devices to these students so they can participate in the same ways as other students? For example, Forsyth has dedicated district resources to ensure all students have access to devices when needed, including 7 to 15 laptop carts (each with 10 devices) for every school, as well as four desktop computers in each classroom.

- **Schools need to support many different kinds of devices and likely need greater Internet bandwidth** – A BYOD system can challenge a school’s ability to support all the variations in hardware and software represented by students’ devices. In addition, there will now be significantly more devices connected to the school’s network, which will require additional Internet bandwidth. If there is a webpage or application that is vital for a lesson, what happens if a student’s device cannot load the content or cannot access it because of bandwidth limitations of the school? Would there be a device available to them or a local network repository of these educational resources that could be used for the lesson?

- **Minimum Device Requirements** – Schools may need to consider setting minimum system requirements for a device to qualify for BYOD. School technology needs vary immensely across states, but schools could establish a set of base requirements that would ensure a device properly operates on the school network. Such requirements could mitigate the issue by ensuring hardware, software, and operating systems meet certain specifications. Most institutions of higher education use this method for incoming students.

- **Awareness Building with Stakeholders and Educators** – Traditionally, BYOD devices such as iPads and mobile phones have been used by parents, students, and teachers alike to access the Internet for leisure activities. As a result, there are likely to be some who are skeptical of the educational relevance of BYOD devices. Therefore, it is important that states, districts, and schools make a significant effort to communicate their value. For example, Forsyth has been working to inform parents of the opportunities these technologies can bring to an education setting and encourage their use by providing BYOD tours for stakeholders, educators, and anyone who is interested in learning more about the program (see http://www.forsyth.k12.ga.us/byottours).

- **Acceptable Use Policies** – Critical to the success of a BYOD program is implementation of a comprehensive Acceptable Use Policy for digital devices brought to school. This is discussed (and a model policy is provided) in Chapter 2 of this report.

Sources: Project Tomorrow, Speak Up 2011: Mapping a Personalized Learning Journey — K-12 Students and Parents Connect the Dots with Digital Learning (Irvine, CA, April 2012), 9; Christine Fox, John Waters, Geoff Fletcher and Douglas Levin, *The Broadband Imperative: Recommendations to Address K-12 Education Infrastructure Needs* (State Educational Technology Directors Association, Washington, DC, 2012), 17; and Jill Hobson, Director of Instructional Technology, Forsyth County Schools (Personal E-mail Communication, July 25, 2012).
Technology infrastructure encompasses more than just these assessments and, as a result, state boards should use it as a discussion starter, and then develop additional measures to assess education technology infrastructure capabilities.

**Guiding Questions for State Boards**

- What is the current state of districts’ and schools’ capacity to integrate technology in meaningful ways in the classroom including access, broadband, and human capital?

- How do investments in infrastructure and changes to technology policy relate to a state’s overall educational mission?

- How can states use both the results of the consortia readiness survey and additional information gathered to assess technology equity between districts and schools?

- Is there a state- or district-level plan in place to address both maintenance and replacement of technology over the long-term?

- Do the state’s schools have the capacity to provide online assessments?

- How has the state examined ways technology can be a tool to address equity issues in education?

**B. Developing Data Systems that Provide Timely, Meaningful Information to Stakeholders, Educators, and Policymakers**

Data is playing an ever-more significant role in the education system. Parents want to know how their student is doing in class, educators want to know how well students understand the material so they can appropriately adjust their instruction, district leaders need to see how their schools are performing in order to determine if any school-specific or district-wide actions are required, and state leaders want to know how schools across the state are doing in order to monitor trends and see what policy actions are needed. These are all different kinds of questions that can be informed by a robust education data system. However, to be able to answer these questions at scale, many more points of data need to be collected beyond results of state standardized tests. As state boards consider the education technology infrastructure component, it is important to consider how the data system will be used and the kinds of questions that can and will be answered by using the system. By doing so, it helps ensure the right data are being collected and information is getting to the people who can use it, when they need it, to make evidence-based decisions for education.

The Data Quality Campaign provides state-level progress reports on the development of robust longitudinal data systems. Every state has taken steps to develop a data system, with 36 states having all 10 elements the DQC identifies as essential to a data system. Given that many states are on the right track to developing robust data systems, the next step is to ensure these data systems are used in meaningful and innovative ways in education decision-making. The textbox on page 42 provides ten state-level actions to ensure effective use of data. Many states could use these actions as a reference on how they want to use data systems to address issues in education.

Note that only three states (Florida, North Carolina, and South Carolina) implement policies and practices, including professional development and credentialing, to ensure educators know how to access, analyze and use data appropriately. In addition, only six states in the country share teacher performance data with education preparation programs. For example, Louisiana is the only state in the country that evaluates teacher preparation programs based on growth in student achievement scores of the teachers they train. These kinds of reflective uses of data are vital to ensuring development of a vibrant educator workforce and are the kinds of evidence-based decisions that are made possible by a robust data system that is being used efficiently. Therefore, it is vital that all actors in the education system know how to use this information and data effectively. Wayman and Cho note:

Data systems are a necessary component of effective data use but they are not sufficient. Although data systems are powerful, indispensable tools for using data, they are like any tool: without proper training, knowledge, and support, they serve less a function. Therefore, it is important that individuals planning for data system use endeavor to prepare, teach, and support users at every turn. This is not just true initially, but ongoing—as with the data systems themselves, users will evolve in their capabilities and abilities.

In addition, data systems need to be accessible. This does not mean everyone should have access to sensitive information in an education data system, but that stakeholders,
Ten State-Level Actions to Ensure Effective Use of Data

- Link state K-12 data systems with early learning, postsecondary education, workforce, social services, and other critical agencies (11 states)
- Create stable, sustained support for robust state longitudinal data systems (27 states)
- Develop governance structures to guide data collection, sharing and use (36 states)
- Build state data repositories that integrate student, staff, financial, and facility data (44 states)
- Implement systems to provide all stakeholders with timely access to the information they need while protecting student privacy (2 states)
- Create progress reports with individual student data that provide information educators, parents, and students can use to improve student performance (29 states)
- Create reports that include longitudinal statistics on school systems and groups of students to guide school-, district-, and state-level improvement efforts (36 states)
- Develop a purposeful research agenda and collaborate with universities, researchers and intermediary groups to explore the data for useful information (31 states)
- Implement policies and promote practices, including professional development and credentialing, to ensure educators know how to access, analyze, and use data appropriately (3 states)
- Promote strategies to raise awareness of available data and ensure that all key stakeholders, including state policymakers, know how to access, analyze and use the information (23 states).

For more information on progress of state-level actions in data systems, visit www.dataqualitycampaign.org.

Educators, and policymakers have access to data relevant to the decisions they make and no more. For example, in Colorado, the state department of education developed a tool that enables users to examine and analyze academic data based on the role of the user – teacher, district administrator, parent, etc. The tool, called the Colorado Growth Model, allows specific groups of educators to access parts of the performance data for the benefit of instruction. For example, curriculum leaders can access growth and achievement reports for all students to help plan grade-wide focuses for a year, while teachers can get individual student progress reports for a number of years and in a variety of subjects so they can cater their instruction to individual student needs. Parents also have the ability to access information for their own student. It is all from the same data-set, but is presented in a variety of ways, and permission for data use is only provided to those for whom it is relevant. Moving forward, this is the kind of use for a data system that could help transform learning and instruction in schools. It provides real-time data to all involved while protecting personal student information.

Data systems are a key component of education technology infrastructure. As state boards consider this component, following are questions policymakers should ask to ensure data is used effectively to improve education.

Guiding Questions for State Boards

- What DQC state actions have been taken by the state regarding effective use of data and what actions should the state want to take to improve use of data in education?
- What has the state done to ensure all educators know how to use data?
- What questions do stakeholders, educators, and policymakers want to have answered from the data system?
- How can technology help facilitate real-time decision making in education?
- What considerations has the state given to providing segmented access to the data system for stakeholders while respecting student privacy?

Many issues in education technology infrastructure revolve around the acquisition or use of technology to support learning. However, in the same ways that students and educators need a technology infrastructure to support the effective use of technology to improve learning, state
boards need to develop a policy infrastructure to support the growth of these kinds of practices. Policies not only need to be developed to support technology integration, but also need to be reexamined to ensure there are not barriers preventing innovative uses of technology in the classroom. The next sections of this chapter explore two key issues that boards can address to build a policy infrastructure to support technology integration in schools—the transition to digital instructional materials and supporting blended and online learning opportunities.

C. Navigating the Transition to Digital Instructional Materials

As states build appropriate education technology infrastructures, along the way there will be policies that need to be revisited because of their digital context. For example, a number of states do not have policies regarding acquisition of digital content that could take the place of traditional textbooks.123 While this may seem like a minor policy issue, it has become a major hindrance to the development and use of digital content in schools in a number of states. Therefore, to prepare for future technologies and develop a well-functioning education infrastructure, it is important that state boards examine current policies regarding instructional materials to ensure previous policies do not hinder budding growth.

Over the last decade, it has become apparent that there are a number of challenges associated with the existing model for acquiring and distributing instructional materials in states. Too many times, instructional content is outdated in schools because of lengthy revision cycles that examine instructional materials in a particular subject every six or seven years or, in the case of California, even longer because of budget shortfalls.124 As a result, these materials are simply not serving the 21st century needs of students and educators. Many states are looking to digital instructional materials as a means of both providing engaging content to students and potentially providing significant cost savings to states and districts. However, to move forward with this vision, state boards need to consider current instructional materials adoption policies.

Digital textbooks are more than simply PDFs of traditional textbooks. Digital textbooks have the ability to link students with engaging content specific to the topics they are covering at that moment through multimedia and video conferencing. Digital textbooks have the ability to provide:

- Content in a variety of forms including digital textbooks, audio and video resources, and interactive content;
- Personalized learning experiences tailored to students’ learning styles; and
- An educational resource that can be updated more efficiently and cost effectively than waiting for the next print cycle of a textbook.125
Principles for 21st Century Instructional Materials

As a part of NASBE’s Instructional Materials Forum in 2009, a set of overarching principles were developed to help guide the transition to next generation instructional materials. Next generation instructional materials need to have the following characteristics:

- Allow for flexible use and control over content by users to meet a range of instructional approaches and modalities and the individualized needs of all students including access by students with disabilities;
- Are closely aligned with state standards for what students should know and be able to do and with the state accountability systems;
- Are accessible “on demand” at the time and place of learning, whether in or out of school;
- Are cost-effective and represent good value for the investment of public dollars;
- Address the need for ongoing educator professional development;
- Are vetted by subject matter experts and educators to ensure academic quality;
- Are frequently updated to reflect new developments in the content areas and be consistent with the development of new standards and assessments;
- Engage learners through multiple media (in print, online, audio and video), as well as through interaction and simulation;
- Are able to be supported by or grow from voluntary, collaborative inter-state efforts.

Source: NASBE, Rethinking the State Role in Instructional Materials Adoptions: Opportunities for Innovation and Cost Savings (Arlington, VA, December 2009), 4-5.

However, in considering the use of digital instructional materials, it is important to note the same challenges of the traditional textbook model apply if resources are not dedicated to keeping the content, extra resources, and instructional approach up-to-date. Fortunately, the development of the Common Core State Standards provides a great opportunity for economies of scale on development, acquisition and upkeep of digital content. Groups of states can potentially pool their efforts to support a set of digital instructional materials including periodic revision and ongoing support. For example, in West Virginia, the state board recommended a two-year freeze on the purchase of social studies textbooks. The money saved will be used on education infrastructure technology building, in preparation for the digital textbook transition.126

Given the potential of digital textbooks in education, in 2009 NASBE convened state board members from across the country to examine what the transition to digital textbooks might look like and principles to guide the transition. Principles developed for digital instructional materials include that they be: closely aligned with state standards; flexible enough to allow educators to use them in various ways to meet individual student needs; available on-demand in and out of school; cost effective; vetted by subject matter experts and educators to ensure quality; and engage students using a variety of media methods.127 The entirety of these principles is provide below and give a great vision for how states can utilize technology through digital textbooks to better facilitate student learning.

However, to achieve this vision, there are policy barriers that need to be addressed that currently prevent many states from moving forward with development of digital textbooks, particularly surrounding definitions of what a textbook is and how textbooks can be acquired. For example, in Indiana, the state board reinterpreted the defi-
nition of a textbook so that it allows the use of and reim-
bursement for computers, data devices, and instructional
software because these media help deliver the content. Without this, there was not enough policy clarity to de-
termine what digital materials could be used in the place
of textbooks. In Texas, a recent created law allows state
textbook money for districts to be used for the acquisition
digital materials. State boards can provide clarity and
guidance, regardless of how a state adopts instructional
materials. Without this kind of policy flexibility, it becomes
significantly more difficult to implement a digital textbook
in a state.

Guiding Questions for State Boards

- What aspects of the current business model for pur-
chasing content on an iterative cycle apply to digital
content and what aspects need to be reconsidered?

- What policy flexibility exists in the state to allow for
the use and acquisition of digital textbooks?

- Does the state provide guidance to help school
districts evaluate the quality of different online and
content products to help determine what best meets
their needs?

- What will the process be for vetting digital textbooks
given that many are developed through a community
of collaborators?

- Given the Common Core and other emerging com-
mon standards, has the state considered exploring
development and maintenance of digital textbooks
through consortia of states?

D. Supporting Blended and Online
Learning Opportunities

In many ways, figuring out how to provide high-quality
online learning opportunities to students will play a
significant role in engaging student learning in ways they
prefer now and into the future. States are experiencing
exponential growth in blended learning opportunities in
schools, i.e., learning that takes place at least in part in an
online setting and in part in a traditional school setting.
Blended learning is becoming a prevalent model for using
technology to engage students. It is a teaching medium
that combines the support of in-person instruction with
the opportunity for students to advance at their own pace
in an online setting, an important quality students desire
when they learn. Virtually every state and the District of
Columbia provide some form of supplemental or full-time
online learning opportunity to students, and student par-
ticipation in these programs has risen by almost 50 percent
since 2007, to 1.5 million students in 2010.

Blended learning opportunities have the ability to enhance
education in a number of ways, including:

- Providing greater access to courses not available
locally;

- Giving students the opportunity to progress through
courses at their own pace but with the support they
need to succeed;

- Giving students who are significantly behind in cred-
its the opportunity to catch up with accelerated credit

The Learning Registry

One initiative that embodies principles from the
NASBE 2009 forum is the Learning Registry. The
registry is not a website, but a framework for
content creators across the country to share the
kinds of digital resources that are being developed.
Through data from the Registry, educators and
content providers can easily find content-based
resources that have been developed specifically for
a particular topic or need with a rating system for
how useful the resource is to the end user.

For example, a 4th grade science teacher might
be looking for ways to engage students around
the Rocky Mountains. In the future, the Registry
hopes to link this teacher with resources on rock
formation, elevation, and a variety of other re-
source that have been developed and are grade-
level appropriate on these issues. This initiative
will be vitally important as massive amounts of
instructional materials are created for the imple-
mentation of Common Core State Standards. All
educators can benefit from being able to link up
with resources specific to their needs as they
integrate the Common Core or other college- and
career-ready standards into the classroom.

Source: Delia R. Duffey and Christine Fox, National
Education Technology Trends: 2012 (Washing-
ton D.C., SEDTA, 2012), 23.
recovery options not typically available in a traditional setting;

• Linking students with teachers, experts, and peers from around the world to provide interactive learning experiences; and

• Using digital instructional materials that can provide immersive educational experiences.  

However, as more and more students are using online learning opportunities, several challenges have emerged. One that many states are struggling with is verifying that students are actually learning the material and are the ones taking the exams, since a login id can be provided to anyone. In one case in Colorado, students were accessing websites that provide solutions to math problems via smartphones when taking online assessments. To address these issues, some states require students to take major assessments in person. For example, participation in South Carolina’s Virtual School Program requires that “(s)tudents enrolled in an online course for a unit of credit must be administered final exams and appropriate state assessments in a proctored environment.”  

From a policy perspective, online learning opportunities can challenge and conflict with many well-established education policies such as seat-time requirements. Confusion can arise when it is unclear which set of policies apply to blended learning programs, since they provide both traditional and online learning opportunities. These blended learning programs could be subject to various seat-time, accreditation, or attendance tracking requirements because they provide a portion of their instruction in the traditional classroom setting. Conversely, traditional courses could be governed under online learning policies because they provide supplemental instruction online for students. As online learning opportunities continue to grow, it is vital for policies to be clearly aligned so they correctly apply to schools and providers. To address this issue, Florida, one of the leading states in online learning, passed a law in 2008 stating that a “provider of digital or online content or curriculum that is used to supplement the instruction of students who are not enrolled in a virtual instruction program... is not required to meet the requirements of [virtual schooling].”  

Online learning is the next frontier in education. If states and state boards can manage the transition from a traditional school setting to a well-integrated blended learning environment through thoughtful policy development, the education system has the opportunity to engage students in ways that maximize learning and at a pace that suits individual needs. Ideally, in time these learning opportunities will be held to the same quality standards as traditional schools and produce better outcomes for students. In the meantime, these kinds of issues need to be addressed if states want to develop quality blended and online learning opportunities for students on a wide scale.  

**Guiding Questions for State Boards**

Where do blended and online learning opportunities fit into the state’s overall vision for education and supporting students both inside and outside of school?

• What policy barriers currently exist that prevent further meaningful integration of technology into instruction and schools such as seat time requirements, Carnegie Credits or ADA requirements?

• What accountability systems are in place to ensure online and blended programs provide quality learning opportunities for students that are comparable to traditional school settings?

• What accountability systems are in place to ensure students are actually doing the work in an online environment?

State boards have the unique position to support a robust education technology infrastructure through thoughtful examination of issues, such as assessing technology readiness in districts, figuring out the kinds of questions that need to be answered when using a data system, and ensuring policies regarding instructional materials and online learning opportunities match the needs of the state without creating additional barriers. Similar to how good education policy provides a framework to support the education system, a robust education technology infrastructure provides the foundation of support needed to implement technology effectively across a state.  

**Recommendations**

1. Ensure that every student has adequate access to a computing device and the Internet at school and home, with sufficient human capital in schools to support their effective use. Education technology infrastructure-building will be a key aspect of ensuring equity and access in schools and communities moving forward. However, technology acquisition is just one piece of an effective education technology plan for a state. Policymakers also need to ensure that
after the state, districts, and schools develop sufficient technology infrastructure, educators know how to use these tools to improve instruction.

2. **States should have an up-to-date technology plan and policy that is reviewed on a pre-determined timeline.** Technology typically stands alone in education, treated as a discrete subject like math or history. However, given the impact technology can have on transforming the entire education system to bring a personalized learning environment to every student, policymakers need to develop a state technology plan that provides a vision for how and where technology can change the way educators interact with students to facilitate learning. A robust education technology plan should include everything from instructional practices to teacher preparation and professional development and how technology can support every aspect of the education system.

Additionally, since the technology landscape rapidly changes, it is important that both technology plans and policies are flexible enough to allow future technologies to flourish and are reviewed on a regular basis to ensure they are still relevant and do not hinder effective integration of technology into the classroom in meaningful and powerful ways.

3. **States and districts should address the interoperability of devices, software and data.** As more and more students start using their own devices in an education setting and as technology continues to evolve, it is important that the ways students interact with the devices remains consistent regardless of device. Therefore, it is important that all devices, regardless of operating system, are able to efficiently and effectively interact with students and are supported by schools.

Additionally, to facilitate vibrant use of data systems, it is important that the data stored in them is accessible to stakeholders in a variety of ways, including providing parents access to relevant information such as student achievement scores that can be downloaded for use on other platforms.

---

**Useful Resources on Education Technology Infrastructure Issues**

The **Data Quality Campaign** (dataqualitycampaign.org) – A state-by-state analysis of both the 10 essential elements of a robust longitudinal data system and 10 state actions that promote the use of these data systems can be found on their website.

**National Broadband Plan** (broadband.gov/plan/) – Broadband is the great infrastructure challenge of the early 21st century. This provides a vision from the U.S. Government on how to approach developing broadband capabilities across the country.

**National Education Technology Plan 2010** (www.ed.gov/technology/netp-2010) – The National Education Technology Plan, Transforming American Education: Learning Powered by Technology, calls for applying the advanced technologies used in our daily personal and professional lives to our entire education system to improve student learning, accelerate and scale up the adoption of effective practices, and use data and information for continuous improvement. It presents five goals with recommendations for states, districts, the federal government, and other stakeholders. Each goal addresses one of the five essential components of learning powered by technology: Learning, Assessment, Teaching, Infrastructure, and Productivity.

**Keeping Pace with Online Learning** (kpk12.com) – This resource provides an annual review of state trends, enrollment data, and analysis of K-12 online and blended learning throughout the country. It also includes individual state profiles on the issues.
1-to-1 laptop initiative – A program to ensure that every student has his or her own computer, one computer per student.

Acceptable Use Policy – Schools commonly ask students, and sometimes parents, to sign such contracts annually as a way to demonstrate agreement with the school’s rules for access the Internet and other forms of technology during school hours and for school-related activities.

App – Short for “application,” an app is a program that usually allows the user to perform a specific function, such as checking the weather or taking a picture. Apps are most commonly used on smartphones.

Bandwidth – Expressed in bits/second or multiples of it (kilobits/s, megabits/s etc.), this is a number that describes the amount of Internet access that is available. For example, a school will have a defined amount of bandwidth available that may limit the number of users that can access the Internet reliably at any one time.

Blended Learning - Learning that takes place at least in part in a traditional school setting and in part through an online setting.

Blog – By definition, blogs are personal journals or diaries where the entries are posted publicly online by individuals. However, they now exist in many different formats, and include websites where opinion-based items are posted on a regular basis.

Bring Your Own Device (BYOD) – This type of policy allows students and staff to use their personal technology devices, such as cell phones and laptops, in the school setting.

Broadband – In contrast to dial-up Internet, this is a type of Internet that is more advanced and most commonly used today. It is faster, creates a greater bandwidth, and is usually transmitted via cable lines, rather than phone lines.

Carnegie Unit – A time-based system (120 hours of contact with an instructor over the course of a school year for secondary school students) for measuring educational attainment. It is the most common system currently used.

Chat, Chatting – Though it can take place across multiple types of formats, chatting online with someone happens in real time, by using the keyboard rather than face-to-face communication.

Children’s Internet Protection Act (CIPA) – Enacted by Congress in 2000, this is intended to address concerns about children’s access to obscene or harmful material online. It imposes certain regulations on schools that participate in the E-Rate program.

Connected Device – A device that has Internet access.

Cyberbully – A cyberbully conducts traditional bullying behavior (harmful actions toward a party that has less power than them that are repeated over time), online or through electronic means.
**Digital citizenship** - A digital citizen is a member of the online community that knows how to harness the power of technology safely, respectfully, and responsibly.

**Digital literacy** – The ability to understand, analyze, utilize, and participate when using multiple forms of digital media.

**Digital natives** – A term used to describe anyone who was born after the advent of the Internet. The important distinction is that they have not lived in a world without the Internet, which makes them more natural adopters of technology.

**E-rate** – A program run by the Federal Communications Commission (FCC) that provides discounts of up to 90 percent to assist most schools and libraries in the United States obtain affordable telecommunications and Internet access.

**Facebook** – The world’s most popular social network site. Free, it allows users to create a profile and “friend” other users. Once they are connected in this way, users can easily see the content (pictures, short messages, news articles, etc.) that their “friends” post as well as interact with them through the site by adding comments to their posts.

**Flipped classroom** – A curricular design that relies on students to access videos and other information about the lesson during out-of-school time. Most commonly, teachers will post videos of the lecture online, and ask students to come to class prepared to spend class time discussing their questions and what they have learned.

**Hardware** – The physical pieces of technology equipment, such as the actual laptop, mouse or cell phone. Software programs are used to make the hardware pieces functional.

**Interoperable** – Data systems that are interoperable allow information to be shared across them, even if they do not use the same equipment to create the data system.

**Media Center** – As a way to better capture its current function within the school, many libraries have been redefined as “Media Centers.”

**Podcast** – Most commonly, podcasts are audio files that are posted online, or accessed through an ipod or other type of MP3 player. They are usually a lecture, talk show, or some type of voice-dominated presentation, as opposed to just plain music.

**Post** – The act of putting information online. For example, a blog entry is “posted” or a video is “posted” to YouTube.

**Profile** – Most social network sites require users to create a profile, which is a page that contains basic information that other members of the network find useful when trying to socially connect, such as a picture, hobbies, or professional interests and experiences.

**Responsible Use Policy** - Schools commonly ask students, and sometimes parents, to sign such contracts annually as a way to demonstrate agreement with the school’s rules for access the Internet and other forms of technology during school hours and for school-related activities. Some schools have begun to call these contracts “Responsible Use Policies” as a way to indicate that it is more than just accessing technology, it is about how to responsibly use it in a way that doesn’t interfere with instruction.

**School Media Specialist** – As a way to reflect the current responsibilities of this school staff member, many schools have changed this title from “librarian” to “school media specialist”.
Skype – A service that allows users to see and hear other individuals by using a video camera connected to each of the users computers. There are ways to videoconference without using this program, such as Google Hangout, but because it is such a popular method, it has become synonymous with videoconferencing.

Smartphone – A cell phone that allows the user to access the Internet and other forms of interactive media aside from traditional calls to others.

Social networking – This is the commonly used term to describe the act of communicating with friends, family and others online, using a specific program or service. Facebook is the most popular social network, but Linked In and Twitter are other examples.

Software – The intangible program that makes a computer or other electronic device function. Microsoft Word is an example of software program. You must install software on to a piece of hardware in order for the hardware to be useful.

Streaming – As opposed to accessing content that has been pre-recorded, streaming video or audio online is similar to watching TV or listening to the radio live. Streaming generally takes more broadband than accessing the information in other ways, so it can be a challenge for schools if multiple classrooms are streaming information at the same time.

Text – A text message is typed out on a cell phone, and sent to another cell phone. It is a common way to communicate without having to ensure the recipient is available at the same time to be a part of a real time conversation.

Twitter – An online service that allows users to post a short message (up to 140 characters per message) on to their profile page. Users decide which other users they would like to subscribe to, and the messages these other users post appear on their personal page along with the messages that they post. An entire shorthand language has been created to allow users to communicate with each other, as well as automatically and simultaneously post their messages on to a group page that is focused on a particular topic. The act of posting a Twitter message is commonly called “tweeting.”

YouTube – Currently the most popular website for sharing and accessing videos.

Videoconferencing – Similar to a phone call, this happens when individuals are connected through video cameras, rather than telephones. This allows them to see as well as hear the other person live.

Virtual School – Though this can, and does, take many different forms, by definition this is a school that does not exist within a school building, but allows students to attend classes “virtually” (i.e., through the Internet) at other locations.

Wikipedia – A popular online encyclopedia, where anyone is able to contribute information to an entry. Because of this policy, the information is not considered to be consistently reliable.

Wifi – The commonly-used term for the type of Internet that is accessible wirelessly.

Wiki – A program that allows a group of users to collaborate. Done online, each can access the document or webpage that is being created in order to add, delete, or modify the content.
Endnotes


3. Ibid.

4. Lenhart, *Teens, Smartphones & Texting*.

5. Ibid.

6. Rideout et al., *Children, Media, and Race*.


8. Ibid.


11. Ibid.

12. Ibid.

13. Ibid.

14. Ibid.

15. Ibid.


17. Ibid.


21. Ibid.

22. Ibid.


24. Ibid.


26. Ibid.

27. Lenhart et al., *Teens, Kindness and Cruelty on Social Network Sites*.

28. Ibid.

29. Ibid.


32. Ibid.


35. Ibid.

36. Lenhart et al., *Teens, Kindness and Cruelty*.


42. Ibid.


44. Bridgeland et al., The Silent Epidemic.


49. Ibid.


54. Ibid.

55. Ibid.

56. Ibid.


58. Mary Ann Wolf, Culture Shift.


60. Education Week, Technology Counts 2009: Breaking Away from Tradition (Bethesda, MD: EPE Research Center, 2009).


63. See www.portal.state.pa.us/portal/server.pt/community/coaches/8919.


66. Ibid.


68. See leadingedgecertification.org/.


70. Ian Quillen, “Virtual Ed. Faces Challenges in Building Quality Controls,” Education Week (August 29, 2011); Pat Kossan, Anne Ryman, and Matt Dempsey, “Online Schools Face Questions over Quality, Effectiveness;

71. See www.txvsn.org/portal/AboutUs/WhoWeAre.aspx.

72. Quillen, “Virtual Ed. Faces Challenges in Building Quality Controls.”


77. Ibid.


82. Ibid.; 30.

83. Ibid.: 30.

84. Ibid.


86. See Measures of Effective Teaching project reports at www.metproject.org/reports.php.


89. Ibid., 27-29.


92. Ibid.

93. Ibid.

94. Ibid.

95. Ibid.


100. NASBE Study Group Reports: *No Time To Wait, Creating Contemporary School Structures for All Students Today and Tomorrow* (2010); *Next Generation Learning: Transforming the Role of Educators Today for the Students of Tomorrow* (2010); *Gearing Up: Creating a Systemic Approach to Teacher Effectiveness* (2011); and *Born in Another Time* (2012).
103. Ibid.


105. Ibid.


112. Ibid., 7.

113. Ibid., 9.


119. Ibid., 9-10.


127. Douglas Levin, Rethinking the State Role in Instructional Materials Adoptions: Opportunities for Innovation and Cost Savings (Arlington, VA: NASBE, December 2009), 4-5.

128. Ibid., 3.


134. Ibid.

The National Association of State Boards of Education is a nonprofit, private association that represents state and territorial boards of education. Our principal objectives are to strengthen state leadership in education policymaking; promote excellence in the education of all students; advocate equality of access to educational opportunity; and assure responsible lay governance of public education.