CREATING ANYTIME, ANYWHERE LEARNING FOR ALL STUDENTS:

KEY ELEMENTS OF A COMPREHENSIVE DIGITAL INFRASTRUCTURE

JUNE 2014

ALLIANCE FOR EXCELLENT EDUCATION

Adequate broadband access is insufficient without a comprehensive digital infrastructure that unlocks the potential of broadband and technology to enhance student learning.

When used appropriately, digital technology and broadband connectivity offer unprecedented opportunities for formal and informal educators to transform the student learning experience in ways and settings that previously were not possible. For underserved students in particular, the effective use of technology has great potential to improve student outcomes, both in and out of the traditional school environment. Yet the students who need it the most are very rarely given the opportunity to experience the benefits that technology affords. This paper describes the key components and policies necessary to build a comprehensive digital infrastructure that supports anytime, anywhere learning. These components include

- ubiquitous **broadband connectivity** paired with robust content and appropriate digital tools;

- a well-articulated plan for fostering **digital citizenship** to ensure the appropriate and responsible use of technology;

- investment in ongoing, consistent, and relevant **professional learning** needed for formal and informal educators to make a necessary pedagogical transformation;

- engagement of **parents and community partners** in cultivating anytime, anywhere learning opportunities that extend beyond the school day; and

- **assessment and data systems** that facilitate individualized, interest-powered, production-centered, and collaborative learning opportunities.

Equitable distribution and adoption of these systems, tools, and approaches must go hand in hand with increased broadband access in and out of school. Without such systems, the students and communities with the highest need will remain unconnected to the increasingly connected and networked world.

In addition to empowering formal and informal educators with the ability to personalize instruction, technology can also help address a lack of perceived relevancy, motivation, and interest in school that can lead older youth to drop out. Technology enables students to become more actively involved in shaping their learning pathways, thereby increasing their voice in the learning process. When educators are able to use technology to connect in-school curriculum with out-of-school interests and real-world issues, something magical happens: students become excited about learning and begin to see how what they're learning in school connects to the world around them.[1] Being able to apply what is learned in school to real-world situations is critical not just for college and career readiness, but also for success in life.

> ENSURING THAT ALL SCHOOLS HAVE ADEQUATE BROADBAND ACCESS IS IMPORTANT, BUT IT IS ONLY THE FIRST STEP IN PROVIDING A HIGH-QUALITY LEARNING ENVIRONMENT.

Effectively applied education technology empowers formal and informal educators to create student-centered learning environments where students become makers, creators, and designers of digital content that reinforces learning. Student agency—or the willingness of students to take ownership and actively invest in their learning—has long been recognized as an important factor in academic success.[2] To the extent that student agency can be nurtured, technology can help students become better collaborators, communicators, critical thinkers, and creative problem solvers—all skills that are necessary for college and career readiness and preparation for future success.[3]

Ultimately, however, technology only creates the *opportunity* for achieving the types of outcomes necessary for college and career readiness. Ensuring that all schools have adequate broadband access is important, but it is only the first step in providing a high-quality learning environment. A comprehensive digital infrastructure is key to unlocking the potential of broadband and technology to enhance student learning and achievement. The total infrastructure is what translates opportunities into outcomes.

BROADBAND CONNECTIONS AND DEVICES

Currently 72 percent of public K–12 schools[4] and the majority of public libraries[5] do not have sufficient broadband to take advantage of the opportunities afforded by digital learning.[6] The reality is that many schools and libraries are attempting to serve hundreds, and sometimes thousands, of users with the same amount of bandwidth typically used by a single household.[7] It is recommended that schools have a minimum of 100 Mbps (megabits per second) for every 1,000 students and staff to sufficiently meet the demands of digital learning.[8] At the same time, 30 percent of households do not have high-speed broadband, and many more lack the necessary speeds for students to properly utilize modern digital learning tools at home. Slow connection rates are concentrated among nonwhite households, the elderly, individuals with low education attainment, households making less than $50,000 a year, and homes in rural areas.[9]
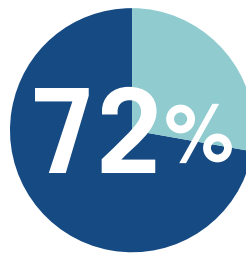
72% 72 percent of public K–12 schools[4] and the majority of public libraries[5] do not have sufficient broadband.
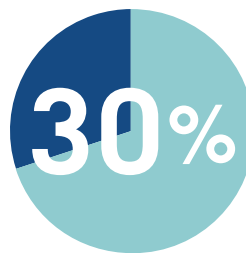
30% 30 percent of households do not have high-speed broadband.

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Learning in the twenty-first century requires that formal and informal educators and students have fast and reliable connections to the internet to

- use a wide range of digital tools, including online communication and videoconferencing tools (Skype, Google Hangouts, and so on);

- collaborate with educators, peers, and others using tools such as learning and content management systems, video streaming, wikis, and social networks; and

- leverage secure cloud capabilities, such as data storage and application deployment.

Although this range of digital tools is most often accessible to students in high-performing or high-income areas, they are critically important for underserved populations, which typically spend far more time on basic skill development and test preparation. Research shows that providing sufficient opportunities for underserved students to

develop problem-solving and other higher-order thinking skills has more positive effects than using digital tools that emphasize basic skills.[10] Inadequate broadband access can severely limit the variety of tools available and the potential of digital learning.

Local, state, and federal leaders increasingly recognize the urgency of limited or no access to broadband. The ConnectED Initiative, a plan proposed by President Barack Obama in 2013, outlines a goal of having 99 percent of students connected to high-capacity broadband within five years. In response to this call to action, the Federal Communications Commission (FCC)—the government agency that regulates interstate and international communications—is conducting a review and rule-making process to modernize its Schools and Libraries Program. Commonly referred to as E-rate, this seventeen-year-old program provides financial support to schools and libraries to adopt broadband and other communication-related services.[11] With funding through E-rate, many state and district partnerships have taken positive steps toward improving internet access, such as implementing and expanding district-wide wireless networks and improving core infrastructure to accommodate the exponential growth of digital devices for learning.[12]

EVERY STUDENT SHOULD HAVE AT LEAST ONE DEVICE THAT CAN BE USED TO ACCESS THE INTERNET FOR LEARNING PURPOSES AT SCHOOL, IN THE COMMUNITY, AND AT HOME.

The expansion of broadband access, however, is only one necessary element of high-quality digital learning practices. Students must also have access to devices that can support the required digital tools and broadband speeds. Every student should have at least one device that can be used to access the internet for learning purposes at school, in the community, and at home. According to Project RED, the first large-scale national study of U.S. K–12 technology implementation, schools employing a one-to-one ratio of devices to students outperform other schools when key conditions[13] are met.[14] These conditions are consistent with many elements of high-quality digital learning practices and include a school-wide focus on change management and the thorough integration of technology into all subject areas.

DIGITAL CITIZENSHIP: LITERACY, SAFETY, AND ETHICS

The extent to which students are able to take full advantage of digital learning opportunities also depends on the ways in which they interact with digital tools and their level of engagement with rigorous content. Students must gain a familiarity and understanding of how to appropriately engage with technology in a way that furthers their learning. Digital citizenship is a concept most often used to represent the knowledge needed to participate effectively and responsibly in a digital world. It includes issues such as digital literacy and online safety and ethics that may be unfamiliar to students despite their proficiency using digital tools.

Elizabeth Forward School District | Elizabeth, Pennsylvania

The Elizabeth Forward School District is a small, suburban district serving an 86 percent economically disadvantaged student population in Allegheny County, Pennsylvania. During the 2013–14 school year, the district implemented an iPad 1:1 program—one iPad per student—with the goal of supporting students as they follow anytime, anywhere individualized learning pathways.[15] As part of the effort, students were provided with quality digital tools, mentorship, and opportunities for collaboration to support those learning pathways.

The high school media center has a video and audio studio, coding stations, televisions, and gaming consoles—all based on industry-standard equipment and programs—as well as open spaces for discussion.[16] Middle school students have access to the Situated Multimedia Arts Learning Lab, or "SMALLab," where students use innovative technology to engage collaboratively.[17] The district also uses digital learning approaches in its science, technology, engineering, and math (STEM) courses and arts-based Entertainment Technology Academy.

Elizabeth Forward's innovative use of a variety of digital devices, powered by high-speed broadband and coupled with a strong focus on the creation of student-centered learning pathways and effective instructional practices, has helped produce significant positive effects on student outcomes. Since implementation, the district has seen a decrease in dropout rates and higher state district rankings.[18]

As one of the components of digital citizenship, digital literacy describes students' "ability to access, analyze and engage in critical thinking about the array of messages they receive and send in order to make informed decisions about the everyday issues they face."[19] The importance of digital literacy was also echoed in a survey conducted by Pew Research Center, which found that teachers of Advanced Placement courses and those with the National Writing Project indicated that digital literacy should be incorporated into every school's curriculum.[20]

There is also a growing movement to better understand the influence of digital media in the lives of youth outside of school. The MacArthur Research Network on Youth and Participatory Politics (YPP) was created to explore how the digital age affects civic and political engagement and the way that youth develop into informed, engaged, and effective citizens. The research network defines participatory politics as "interactive, peer-based acts

through which individuals and groups seek to exert both voice and influence on issues of public concern."[21]

Given that a growing number of youth report getting news about current events from participatory channels such as Twitter, Facebook, blogs, and YouTube, the need to assist learners with more effectively evaluating the credibility and accuracy of information from these sources is imperative.[22] This is an area in which many afterschool providers, like Digital Youth Network (DYN), are actively involved in helping youth to appropriately interpret and respond to the unlimited amounts of information quickly available at their fingertips. DYN is a Chicago-based hybrid digital literacy program that spans both in-school and out-of-school contexts. Working closely with a variety of youth-serving institutions, DYN provides youth with training in the use of digital tools and works with teachers, mentors, and a variety of informal educators to provide meaningful opportunities for youth to demonstrate these skills.[23]

There are a number of advocacy groups working to promote awareness of good digital citizenship as the central component of using digital resources effectively. Cable in the Classroom incorporates digital literacy into its digital citizenship plan by helping students understand what digital information is being conveyed, what media is used to transmit information, and what technology makes it work.[24] Common Sense Media focuses on internet safety, privacy, and security, relationships and communication, cyberbullying, digital footprint and reputation, self-image and identity, information literacy, and creative credit and copyright—all of which factor into students' constructive and safe experiences with digital tools.[25] IKeepSafe provides resources for policymakers, parents, educators, communities, and youth to develop positive practices that balance ethics, privacy, reputation, relationships, and online security in their roles as digital citizens.[26]

Cajon Valley Union School District (USD) | San Diego, California

Cajon Valley USD is a diverse district with more than 30 percent of the student population consisting of English language learners (ELLs) and more than 60 percent qualifying for free or reduced-price meals. To address annual low performance, the district adopted a comprehensive school improvement effort, which included improving its digital infrastructure. Along with the goals of expanding wireless service to support a one-to-one device ratio, the Cajon Valley technology plan highlights the need for educator support and a culture change that emphasizes student-centered learning in schools.[27]

The district's technology plan also includes digital literacy as one of its priorities. The plan outlines a training program for teachers that provides ongoing, monthly workshops intended to develop specified digital skill standards.[28] Cajon Valley also prioritizes the development of curriculum focused on the creation of student content and integration of student voice to meet the needs of all students.[29]

In terms of school culture, a survey sponsored by the California Department of Education found that Cajon Valley students are experiencing more caring relationships with teachers and feeling more personally connected to the school since the program's beginning.[30] The district's test scores and Academic Performance Index are also on the rise, demonstrating the ways in which a thoughtfully implemented technology plan can help support student outcomes and strengthen student-teacher relationships as part of a comprehensive school improvement effort.

PROFESSIONAL LEARNING

Formal and informal educators are an essential component of a comprehensive digital infrastructure. They need their own systems of support and training in order to fully realize and take advantage of the potential of digital learning. Often the most innovative educators are those who are personally invested in experimenting with new instructional strategies. They seek out professional learning opportunities outside of school and invest much of their own time into refining their practice.

This continuous and comprehensive learning process reflects the need for educators to move to a professional learning model as opposed to the traditional episodic professional development opportunities that are limited to a top-down, hours-based, "sit-and-get" approach that is highly ineffective for educator growth. Furthermore, many traditional types of technology-related professional development simply focus on how to use particular tools, not how the tools can be used to transform the learning environment into one that is personalized and student centered. Cajon Valley USD in San Diego feels that in order for professional learning to be effective it must be accompanied by "long term, classroom-centered support [to help] teachers develop confidence and skill in integrating technology into their daily work with students."[31] Job-embedded, differentiated professional learning is a vital aspect of educator improvement and proficiency.

Effectively integrating digital media and tools into the classroom requires significant pedagogical shifts that do not happen overnight. Districts and schools must find ways to support the development of *all* teachers, particularly in underperforming schools that struggle to retain high-quality teachers. An effective professional learning strategy

cannot rely solely on teachers who take the initiative to find supportive communities of practice in their spare time. Ongoing, subject-matter-specific, hands-on professional learning opportunities must be part of the institutional structure—including allotting adequate time and resources to support teachers.[32]

Equally important is ensuring that informal educators also have access to adequate training on effective digital learning practices. Opportunities for professional learning are far less available to informal educators working in these settings, but the need is just as great. In response, organizations like the Allegheny Partners for Out-of-School Time (APOST) are working to recruit and train volunteers to build the capacity of afterschool programs. With financial support from the Sprout Fund, APOST created the Remake Learning Digital Corps to help afterschool

programs more effectively use digital tools. While the initiative is still in the very early stages of implementation, the goal is to connect a team of trained digital learning experts with afterschool programs throughout Allegheny County, Pennsylvania.

Although sometimes underestimated, professional learning opportunities must be sustained through a supportive culture established by the leadership team. Once formal and informal educators are trained in new skills and technologies, they should be rewarded for taking risks without fearing the consequences of failure or worrying that it will negatively affect their performance. Failure is a necessary part of embracing change. Therefore, building a culture of trust, engagement, and growth is vital to producing meaningful results from professional learning opportunities.

Albemarle County Public Schools (ACPS) | Albemarle County, Virginia

Albemarle County Public Schools (ACPS) is a diverse district that serves more than 13,000 pre-K–12 students from rural, urban, and suburban settings. All ACPS's strategies for implementing technology are guided by the district's student-centered vision for learning. Along with its long-term proposals of providing every student with a personal computing device and offering high-speed internet across the entire county, the district's educational technology plan emphasizes the participation of all instructional leaders (teachers, librarians, media specialists, principals, assistant principals, coaches, department chairs, and so on) in a student's learning network. The district uses video, online mentoring, and a robust community of practice to offer ongoing, job-embedded support for teachers' professional learning.

These leaders are then encouraged to work with parents and community partners, such as local public libraries, to provide a positive, collaborative culture that enables students to explore multiple learning pathways.[33]

Digital infrastructure at ACPS is purposefully aligned to its learning philosophy of helping students gain twenty-first-century skills through "lifelong-learner competencies" defined around the principles of collaboration, communication, critical thinking, and creativity.[34] The district's technology plan supports the larger district goals of eliminating the achievement gap and retaining diversity among teachers. Using this approach, the district has accomplished exemplary academic outcomes for students, such as reaching on-time graduation rates of 93.4 percent.[35]

PARENTS AND COMMUNITY PARTNER ENGAGEMENT

Student success should not be solely the responsibility of K–12 schools. Emerging models of community engagement demonstrate that collaboration between formal and informal learning institutions can help support college- and career-readiness standards. The community of informal educators, mentors, coaches, parents, and peers who support youth during afterschool and summer hours plays a very important role in shaping individualized learning pathways. Studies show that connecting learning opportunities across a variety of youth-serving institutions strengthens overall engagement and interest in school.[36] Meeting college- and career-readiness standards for all students requires that learning doesn't start and stop with the school bell.

CONNECTING LEARNING OPPORTUNITIES ACROSS A VARIETY OF YOUTH-SERVING INSTITUTIONS STRENGTHENS OVERALL ENGAGEMENT AND INTEREST IN SCHOOL.

A comprehensive digital infrastructure enables schools, libraries, and other youth-serving institutions to serve as technological learning hubs in the community. As the Alliance for Excellent Education has recognized in its widely used systemic planning tool for districts, Project 24, "the context, culture, and learning environments that are provided with the intent of increasing student learning include both the formal structures within the school day and the informal structures that may extend learning beyond the typical school day in the home and community." This approach actively involves the community in achieving student learning goals by

- bringing relevance to curricula through partnerships that take the shape of apprenticeships and the use of community-based experts and resources;

- using common responsible policies to govern the use of technology in and across school- and community-based programs;

- providing community-based exhibitions, reviews, critiques, and celebrations of student work; and

- supporting the alignment of afterschool programming with in-school curricula.

Using Technology to Support Learning Ecosystems

The Hive Learning Network provides grants for formal and informal youth-serving institutions to coordinate the learning occurring in a variety of environments within a community. It aims to support schools and community partners using technology to allow youth anytime, anywhere learning experiences based on their personal interests.[37] Currently operating in four major cities—Chicago, Pittsburgh, New York City, and Toronto—the Hive is designed to facilitate alignment among local youth-serving institutions in a way that connects learning across schools, libraries, museums, and many other out-of-school programs. The goal is to enable youth to more easily identify and participate in accessible anytime, anywhere learning activities within their community. In this way, the Hive is helping to connect parents and youth to a broader network of institutions and organizations providing affordable programming that supports in-school learning.

YOUMedia Chicago consists of five Chicago public libraries that offer middle and high school students a space available yearlong and after school to pursue their interests. Learning in this space engages students by offering high-quality programming in combination with real-world experiences. Students are equipped not only with books but also with digital tools such as laptops, desktops, cameras, drawing tablets, video- and photo-editing software, and an in-house recording studio, all of which have high-speed connections. Programs offered by YOUMedia succeed in part because of the valuable community partnerships they incorporate. For example, youth have the option of attending workshops led by Chicago Public Library librarians and DYN mentors and of collaborating with other youth and mentors for guidance on

digital projects. Through these experiences, students gain valuable digital literacy skills as they learn and produce meaningful digital content.[38]

Riverside Unified School District in California was one of twenty projects selected to receive funding through the Learning-on-the-Go (LOGO) wireless pilot program created by the FCC in 2010. The program was designed to explore the merits and challenges of enabling schools and libraries to offer off-campus access to e-textbooks for students; netbook connectivity for students living in remote, isolated areas; access to flexible, online education programs for homebound students unable to attend classes; and a variety of other forward-thinking projects.[39] The funding received from the LOGO program made it possible for Riverside to give its students—more than 67 percent of whom are from underserved populations—the opportunity to learn anywhere, anytime, not just at school.

The district focused on five different middle schools that failed to meet Adequate Yearly Progress as identified by the No Child Left Behind Act. As part of the effort, both parents and students were required to participate in a two-hour in-person training on how to use the devices responsibly and were given a variety of online resources to further their learning at home. Students were then provided with netbooks equipped with unlimited broadband access; digital curriculum, cloud-based communication, and collaboration tools; and a specially designed student data dashboard that delivered real-time data to students and parents. Participation in the LOGO pilot helped each of the five participating schools increase their Academic Performance Index during the 2011–12 school year.

ASSESSMENT AND DATA SYSTEMS

The ability to create personalized, student-centered digital learning opportunities is heavily reliant on access to real-time data about student performance that can be used to inform instructional practice. Assessment and data systems enable those involved in the total student learning process to create—and continually adjust—learning pathways that can be unique to each student and responsive to individual needs. A comprehensive digital infrastructure should support pedagogical shifts by equipping educators with useful, timely data that helps them design engaging learning experiences; measure understanding of key concepts; and better identify the early-warning signs for students at risk of falling behind. The ultimate goal is about getting the right information into the right hands at the right time. In this model, the teacher transitions from being front and center in the classroom providing information to utilizing individual student data to make real-time instructional decisions for each child.

In recent years, many schools and districts have made progress toward building data and assessment systems that serve as an academic improvement tool rather than simply a means with which to judge teacher effectiveness. Aside from the technical expertise required to build and maintain those systems, a great deal of professional learning is required to ensure that schools and teachers have the capacity to use the data in a meaningful and efficient way. Effective district and school policies are needed to provide guidelines for the type of data that should be included; often they are complex and diverse systems that combine formative and summative assessment results with attendance records and other nonacademic data. Student data and privacy needs are paramount, and educators must adhere to Children's Internet Protection Act, Children's Online Privacy

Protection Act, and Family Educational Rights and Privacy Act regulations, and devise appropriate policies for who should be given access to the data and for what purpose.

POLICY CONSIDERATIONS

The creation of anytime, anywhere learning environments requires federal, local, and school policies that help increase student access to a comprehensive digital infrastructure for learning. Key issue areas include

- ensuring low-cost, **high-quality broadband** to schools, homes, and community institutions;

- **improving equity of access** to high-quality digital devices, applications, and content that students can use as learning resources;

- promoting policies that **advance digital literacy skills** for teachers, parents, students, and community members;

- **supporting professional learning** for school leaders, formal and informal educators, and community organizations on the best ways to utilize digital learning tools to personalize learning, allowing all students to reach their full potential; and

- encouraging districts to **engage in community partnerships** that **promote college and career readiness** for all students.

CONCLUSION

Today's students must experience rich learning opportunities in different settings with a wide range of formal and informal educators. One of the prerequisites for connecting these learning environments is a comprehensive digital infrastructure. While high-speed broadband within schools, throughout communities, and at students' homes is vital, equally important is providing students with the ability to interact with quality content on a wide range of devices, including smartphones, tablets, and laptops. A comprehensive digital infrastructure also supports effective student participation by fostering digital citizenship and other skills necessary to properly utilize digital learning tools. Differentiated, ongoing, meaningful professional learning opportunities strengthen the ability of formal and informal educators and mentors to effectively infuse digital learning and data assessment into everyday instruction. Finally, tapping into existing networks of community partners and parents to expand learning beyond the school day optimizes resources and promotes increased student engagement.

Programs like those in YOUMedia, Hive Learning Networks, and districts like Cajon Valley USD and Albemarle County Public Schools are already demonstrating how students benefit from learning environments with strong, multifaceted digital infrastructures. The lack of any one of the infrastructure elements compromises the entire vision of anytime, anywhere learning. However, when all of the elements are in place, the potential of digital learning to transform education can be realized on a much grander scale for all children and beyond isolated models of success.

ENDNOTES

1 I. Mizuko et al., "Connected Learning: An Agenda for Research and Design," Digital Media and Learning Research Hub, 2013, http://dmlhub.net/sites/default/files/Connected_Learning_report.pdf (accessed May 2014).

2 "A Special Section on the Achievement Gap: Education Reform as if Student Agency Mattered: Academic Microcultures and Student Identity," *Phi Delta Kappan* 84, no. 8 (2003): 579–85.

3 K. Purcell, J. Buchanan, and L. Friedrich, "The Impact of Digital Tools on Student Writing and How Writing Is Taught in Schools," Pew Research Internet Project, 2013, http://www.pewinternet. org/2013/07/16/the-impact-of-digital-tools-on-student-writing-and-how-writing-is-taught-in-schools/ (accessed May 2014).

4 "Broadband Information Gap," Education Super Highway, http://www.educationsuperhighway.org/broadband-information-gap.html (accessed May 2014).

5 "Examining School and Library Broadband Connectivity: A Connected National Policy Brief," Connected Nation, July 19, 2013, http://www.connectednation.org/sites/default/files/bb_pp/connected_assessment_policy_brief_final.pdf (accessed May 2014).

6 Digital learning is any instructional practice that effectively uses technology to strengthen a student's learning experience. It emphasizes high-quality instruction and provides access to challenging content, feedback through formative assessment, opportunities for learning anytime and anywhere, and individualized instruction to ensure that all students reach their full potential to succeed in college and a career.

7 "The Need for Speed," Education Super Highway, http://www.educationsuperhighway.org/the-need-for-speed.html (accessed May 2014).

8 C. Fox et al., "The Broadband Imperative: Recommendations to Address K–12 Infrastructure Needs," State Educational Technology Directors Association, 2012, http://www.setda.org/wp-content/uploads/2013/09/The_Broadband_Imperative.pdf (accessed May 2014).

9 A. Smith and K. Zickuhr, "Home Broadband 2013," Pew Research Center's Internet and American Life Project, August 26, 2013, http://www.pewinternet.org/files/old-media//Files/Reports/2013/PIP_Broadband%202013_082613.pdf (accessed May 2014).

10 B. Bos, "The Effect of the Texas Instrument Interactive Instructional Environment on the Mathematical Achievement of Eleventh Grade Low Achieving Students," *Journal of Educational Computing Research* 37, no. 4 (2007): 351–68.

11 The implementation of the FCC's E-rate program and of other related federal programs varies among communities and changes constantly over time. For example, starting in 2013, the FCC created a Notice of Proposed Rulemaking (NPRM) to receive public comments on and start the process of modernizing and restructuring E-rate. See Federal Communications Commission, "FCC Launches Modernization of E-rate Program to Deliver Students and Teachers Access to High-Capacity Broadband Nationwide," July 19, 2013, http://www.fcc.gov/document/fcc-launches-update-e-rate-broadband-schools-libraries (accessed May 2014).

12 L. Meyer, "Florida School District Deploys District Wide Wireless LAN," *Journal*, June 4, 2014, http://thejournal.com/articles/2013/06/04/florida-school-district-deploys-district-wide-wireless-lan.aspx (accessed May 2014).

13 The Project RED survey of 997 schools—across forty-nine states and the District of Columbia—identified nine key implementation factors that were linked most strongly to success in schools with a one-to-one student-computer ratio. Those factors included the integration of technology throughout every class period; the presence of a strong plan for change management led by principals; opportunities for online collaboration between students; the integration of technology into core curriculum on at least a weekly basis; the use of online formative assessments on at least a weekly basis; low student-computer ratios; the use of virtual field trips; daily use of search engines by students for classroom activities; and adequate training for principals to cultivate teacher buy-in and implementation.

14 "Findings," Project RED, http://www.projectred.org/about/research-overview/findings.html#one (accessed May 2014).

15 "IPads," Elizabeth Forward, http://www.efsd.net/iPads.cfm (accessed May 2014).

16 "Elizabeth Forward Media Center: Transforming the School Library for the 21st Century," Hive Pittsburgh, http://hivepgh.sproutfund.org/project/elizabeth-forward-media-center/ (accessed May 2014).

17 "SMALLaBlog Version 1," Elizabeth Forward Middle School, http://www.efsd.net/MiddleSchool.cfm?subpage=6556 (accessed May 2014).

18 "Elizabeth Forward School District: Producing Life-Long Learners, Working with the Community," Hive Pittsburgh, http://hivepgh. sproutfund.org/organization/elizabeth-forward-school-district/ (accessed May 2014).

19 R. Hobbs, "Digital and Media Literacy: A Plan of Action," Aspen Institute of Communications and Society Program, John S. and James L. Knight Foundation, 2010, http://www.scribd.com/ doc/157308669/Digital-and-Media-Literacy-A-Plan-of-Action (accessed May 2014).

20 Purcell, Buchanan, and Friedrich, "The Impact of Digital Tools on Student Writing."

21 "About Us," Youth and Participatory Politics Research Network, http://ypp.dmlcentral.net/pages/about (accessed May 2014).

22 C. Cohen et al., "Participatory Politics: New Media and Youth Political Action," June 2012, http://ypp.dmlcentral.net/sites/default/ files/publications/Participatory_Politics_New_Media_and_Youth_ Political_Action.2012.pdf (accessed May 2014).

23 "About Us," Digital Youth Network, 2014, http://digitalyouthnetwork. org/ (accessed May 2014).

24 "Digital Citizenship: Digital Literacy," Cable in the Classroom, http://www.ciconline.org/DigitalCitizenship/DigitalLiteracy (accessed May 2014).

25 "Scope and Sequence," Common Sense Media, 2014, http://www.commonsensemedia.org/educators/scope-and-sequence (accessed May 2014).

26 "About Us," iKeepSafe, 2014, http://www.ikeepsafe.org/about-us/ (accessed May 2014).

27 T. Duggan Schwartzbeck, "Cajon Valley Union School District: Changing the Culture of Learning to Empower Students," Alliance for Excellent Education, May 2013, http://all4ed.org/wp-content/ uploads/2013/06/CajonValley.pdf (accessed May 2014).

28 J. Cook, "Comprehensive Educational Technology 3-Year Plan: 2011–2014," Cajon Valley Union School District, http://www. cajonvalley.net/files/filesystem/cvusd%20tech%20plan%20final%20 2011%202014%20v10_cr.pdf (accessed May 2014).

29 Ibid.

30 Ibid.

31 Ibid.

32 "Keeping the Promise of the 21st Century: Bringing Classroom Teaching into the Digital Age," Inverness Research, 2009, http:// www.nwp.org/cs/public/download/nwp_file/12464/inverness_policy_ brief_for_web_043009.pdf?x-r=pcfile_d (accessed May 2014).

33 "Educational Technology Plan," Albemarle County Public Schools, 2012–2015, http://www2.k12albemarle.org/dept/dart/edtech/ Educational%20Technology%20Documents/ACPS%20Ed%20 Tech%20Plan_12-15_FINAL.pdf (accessed May 2014).

34 "Lifelong-Learner Competencies," Albemarle County Public Schools, http://www2.k12albemarle.org/acps/division/Pages/ Lifelong-Learner-Competencies.aspx (accessed May 2014).

35 "Fast Facts: 2012–2013 School Year," Albemarle County Public Schools, http://www2.k12albemarle.org/acps/division/Pages/fast-facts.aspx (accessed May 2014).

36 Mizuko et al.,"Connected Learning: An Agenda for Research and Design," Digital Media and Learning Research Hub, 2013, http://dmlhub.net/sites/default/files/Connected_Learning_report.pdf (accessed May 2014).

37 "About the Learning Networks," Hive, 2014, http:// hivelearningnetwork.org/choose-a-site-below-to-view-the-site-for (accessed May 2014).

38 "About Us," YOUmedia Chicago, http://youmediachicago.org/2-about-us/pages/2-about-us (accessed May 2014).

39 "Summary of Interim Reports Submitted by EDU 2011 Pilot Program Schools and Libraries," Federal Communications Commission, 2011, http://apps.fcc.gov/ecfs/document/view;jsessio nid=Cj77PR8RT28G7xXC4PylN9tmhNtyH9ltgBtmrLJcmFDttGl2G dnR!-1969853125!NONE?id=7021912339 (accessed May 2014).