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Comments by: The State Educational Technology Directors Association (SETDA)

**BROADBAND DEPLOYMENT DATA**

**1. We seek information on the current state of broadband connectivity, device availability, and adoption in U.S. schools and classrooms.**

Unfortunately, many states and school districts do not have sufficient broadband access to fully integrate modern technology tools and resources into the classroom environment. According to statistics compiled from the E-Rate program, 98 percent of schools have basic Internet access. However, for many of these schools, access is often limited and at low speeds. For example, access may mean that a school is considered "connected" when it only has one computer dedicated to administrators use for email purposes. In addition, in many school districts Internet access is not even baseline broadband and thus, is insufficient to handle current and emerging technology applications that demand ever increasing bandwidth, such as video streaming, video conferencing, and online interactive learning.

Based upon our observations, most schools in the country are at T1 (1.54 Mbps) connection speeds between the school buildings with some having additional capacity. With these bandwidth speeds, schools are trying to accommodate the technology needs of many concurrent users. Compared to the average household with broadband access of at least 5 Mbps, with just a few users, bandwidth in many schools is significantly lower with many more concurrent users. Broadband connection speeds in schools are already behind average households, and in the next few years as bandwidth needs expand, schools will need to significantly upgrade their high-speed broadband capabilities to try to keep pace with what children are accustomed to at home. Even in schools that are sufficiently connected with broadband, bandwidth demand is quickly exceeding capacity as they utilize advanced technology tools. Simply having connectivity is not enough: without measurable upgrades in bandwidths to allow for greater speeds – or even to maintain current speeds as demand grows, teachers and students will be severely limited in the technology applications they can utilize.

**Challenges for Broadband Deployment**

Major broadband deployments are too large and expensive for most school districts to undertake on their own. Instead, large-scale broadband initiatives are developed and implemented at the state government level or by private industry rather than schools or school districts. Unlike many colleges and universities, schools and school districts do not acquire their own fiber though they may gain access to fiber through

their state networks, many of which acquire fiber through long-term IRUs (Indefeasible Rights of Use), frequently as independent 501(c)3s.

Schools rarely initiate major broadband initiatives due to a lack of:

- Reliable sustainability models
- Affordable broadband pricing from service providers
- Predictable multi-year school budgets with adequate e-rate match

In addition, many school districts find it extremely the difficult to get approval on local school bond initiatives for increased bandwidth when school buildings are in need of basic repairs. There are also some school districts, which are discouraged from initiating or expanding broadband adoption because of the complexities and risks inherent in the existing E-Rate program, including the uncertainties surrounding Priority 2 funding. Furthermore, many start up-expenses and non-recurring costs in broadband deployments are not covered by E-Rate at all. Even more surprisingly, there sometimes remains a lack of public and administrative understanding as to the essential nature of broadband when it comes to preparing students to survive in a digital world by mastering the necessary information, communication and technology (ICT) skills. While the Universal Service discounts for schools and libraries (E-Rate) has improved access in many schools and libraries across the country, more needs to be done to ensure that schools have the best access available. The barriers of limited budgets and access to training for educators prevent them from receiving the full benefit from the E-Rate program.

**Connectivity**

In June 2008, SETDA suggested the following recommendations as related to broadband connectivity. In a technology-rich learning environment for the next 2-3 years, provide:

- An external Internet connection to the Internet Service Provider of at least 10 Mbps per 1,000 students/staff
- Internal wide area network connections from the district to each school and between schools of at least 100 Mbps per 1,000 students/staff

In a technology-rich learning environment for the next 5-7 years, provide:

- An external Internet connection to the Internet Service Provider of at least 100 Mbps per 1,000 students/staff
- Internal wide area network connections from the district to each school and between schools of at least 1 Gbps per 1,000 students/staff.

Eighteen months later we believe we should be aiming toward the second recommendation as soon as possible.

**BROADBAND IMPLEMENTATION**

**2. We seek comment on school and school system broadband initiatives including infrastructure and large-scale application deployment.**

**Examples of Successful System Broadband Initiatives**

**Alaska**
Broadband is critical to providing Bering Strait School District (Alaska) students with the same high quality education opportunities as non-rural communities. BSSD is located in coastal northwest Alaska covering an area of approximately 80,000 square miles, with fifteen schools and about 1,800 students. BSSD utilized SchoolAccess, a high-speed satellite network that provides basic connectivity, managed services, and videoconferencing. SchoolAccess was created to allow rural communities to access broadband connections over satellite through E-Rate funding. Today, BSSD has 3 Mbps connections from each school to the district office in Unalakleet that are heavily relied upon to create a coherent sense of community throughout the district, provide educational opportunities to students, and allow teachers and administrators to meet without having to fly between communities.

**California**
Lemon Grove School District, east of San Diego, California is a successful community model bringing high-speed broadband access to the school district and the community. Lemon Grove School District created a Connected Learning Community, Lemon LINK, to connect all schools and the city via an infrastructure that includes microwave, fiber-optic and laser technologies. The community network reaches all schools and city government facilities, including city hall, fire stations, public works, recreation, and community centers. In Lemon Grove, the school district serves as the communication hub for the whole community, with a common portal linking the city to the educational system. Every classroom in the school district is connected to the network, and all computers in the classroom are connected to the Internet. Through a partnership with a local broadband provider, Lemon Grove provides high-speed Intranet connectivity between the students' homes and the school district. The Intranet enables parents, teachers, and the community to correspond and interact on a regular basis. With sufficient numbers of computers (2:1 students to computer ratio) in the classroom and access to high-speed broadband at far above average speeds, teachers report that they are integrating technology in the curriculum at every grade level. Teachers are developing web-based instructional units, and students are able to regularly access the Internet throughout the day. Student achievement has increased in both math and reading for 3rd grade through 6th grade. In 2001, three of the four district's Title I schools received state awards for "High Achieving Title I Schools."

**Colorado**
Colorado school districts currently experience a wide range of broadband connectivity options. From individual districts' building to building enterprise Wide Area Network (WAN) to each district's broadband connectivity to its Internet

Service Provider (ISP) of choice. The cost structure that each school district faces vary based upon the diversity of the number and type of available connectivity options. Rural Colorado districts may experience local WAN (or intra-district WAN) connectivity that is only available from one single provider, with limitations as to growth potential and at costs as high as $800 per 1 Mbps of service. Urban districts may benefit by having competitive WAN offerings by multiple providers at or below $100 per 1 Mbps of service. In addition to this intra-district WAN cost disparity, access to an ISP connection with its dependence on variable broadband infrastructure components needed to deliver the final connection to the ISP, the end-to-end district to ISP connection cost (between urban and rural districts) are again as far apart as was shown in the intra-district WAN example.

**Florida**

In October of 2007, Florida's Orange County (Orlando) Public Schools (OCPS) completed its new, district-wide, high-speed Internet connectivity solution, known as the Managed Broadband Internet Access (MBIA) project. The project was architected by the Information Technology Department with an objective to completely upgrade the district's wide area network to provide a minimum of 10 Mbps of connectivity to each school – to increase productivity and enhance teaching and learning throughout OCPS schools. The highly scalable network is not only capable of securely supporting data, voice and video on a single network but is also able to meet the growing needs of their diverse and rapidly expanding student population that numbers over 176,000. The long-term vision is to reach a goal of increased Internet service capacity with a high-speed network designed to scale to 10 Gbps of connectivity and beyond. OCPS' is already an experiencing a return on the investment in MBIA. Today, students and teachers are enjoying vastly increased Internet capacity and thus benefiting from important classroom applications and rich online resources that previously were unavailable to them due to insufficient online access. Building Literacy and Skills through Technology, BLASST is a reading program for developing reading, writing, research, presentation and technical skills while working on projects in a variety of core subject areas. Instead of utilizing lectures, textbooks and worksheets, the curriculum incorporates word processing, spreadsheet and presentation software, databases and laptop computers wirelessly connected to the Internet to delve deeper into content as well as build 21st Century skills.

**Maryland**

Charles County Public Schools (CCPS) in Maryland provides a program to provide broadband access to all 37 schools in the district. CCPS utilizes Network Maryland, a statewide high-speed network that provides basic network connectivity for all public entities in the state, including government, courts, libraries, and schools. Network Maryland was created to provide economies of scale for public agencies throughout the state and to help communities gain access to broadband. CCPS currently receives 40 Mbps of internet bandwidth to the students and staff of approximately 30,000. CCPS manages the external 40 Mbps Internet bandwidth by paying for services based upon current demand. CCPS monitors demand, so that

administrators, teachers, and students are not overtaxing the system with excessive use of non-educational content. Internally, CCPS maintains a 2 Gbps connection between all school sites to provide access to applications and content. In addition, CCPS has built out a voice, data, and video network infrastructure providing universal access to instructional and administrative resources. CCPS has also implemented universal wireless access throughout the school district, further enhancing the capabilities of teachers and administrators to access information anytime, anywhere. Learning Environment CCPS believes that high-speed broadband access for every school in the district is necessary to meet instructional requirements, including distance learning. CCPS recently started digitizing the core subject areas and mapping it to state curriculum. After professional development training, teachers were able to create lesson plans in hours instead of days, and easily use streaming technology to provide voice, data, and video to the classroom environment. With wireless networks, CCPS created an on-demand, anytime, anywhere instructional model -- teachers can conduct lessons anywhere in the school.

**Missouri**

The Missouri Research and Education Network (MOREnet) provides connectivity and related technical services to most higher education institutions, K-12 school districts and public libraries in Missouri. The use of bandwidth among these organizations is significant and continues to increase. In both 2008 and 2009, MOREnet experienced an annual bandwidth increase of more than 40 percent among its K-12 school district members alone. In attempting to provide the bandwidth to meet the districts' increasing needs, MOREnet, following E-rate regulations, places all member sites on competitive bid. As of November 2009, more than 40 K-12 districts do not have the option to increase their bandwidth beyond 10 Mbps due to a lack of vendor responses or because the response was cost prohibitive; some examples exceeded $14,000 per month for a 10 Mbps connection. This lack of bandwidth availability in rural areas and/or major expense significantly limits the schools districts' ability to utilize readily available systems and resources to deliver and enhance instruction and potentially prohibits them from implementing new and emerging technologies as they become available.

**Pennsylvania**

The Act183 E-Fund grant program in Pennsylvania has provided upgraded broadband services to hundreds of school districts and intermediate units across Pennsylvania, giving students greater access to information which is critical to enhancing their learning experience. In 2004, the state legislature and the Rendell Administration worked together to pass Act 183, which changed the regulatory environment for telecommunications companies in Pennsylvania. Part of that law created a new educational technology grant program called the E-Fund. It is financed by local phone companies at $10 million per year to stimulate the deployment of better telecommunications infrastructure in Pennsylvania. Since the passage of Act 183, Pennsylvania schools have witnessed a complete turnaround in

connectivity. Almost all schools now have access to high speed networks, with the overwhelming majority connected at 100 Megabits per second (Mbps) or even Gigabit speeds. Because of the E-Fund, schools in the most rural parts of the state now have the same or better service as those in urban and suburban areas. Rich and poor schools alike have seen marked improvements in educational technology capacity. Indeed, every district in the state has received the opportunity to join high speed broadband network for K-12 schools. The E-Fund enables the Pennsylvania Department of Education (PDE) to give out grant dollars to schools for improving their technology infrastructure in accordance with Act 183's provisions. It is worth noting that financing for the E-Fund is from certain telecommunications companies and not from the general fund or the taxpayers.

Over the first four years, the E-Fund has financed Wide Area Networks, or WANs, for 97 percent of all Pennsylvania school districts. It also created Pennsylvania's first statewide broadband network for education, known as PAIUnet, which connects schools across the Commonwealth. These are tremendous accomplishments considering the law has only been on the books since 2004. Additional accomplishments include:

- 474 percent increase in total bandwidth among schools statewide
- 74 percent increase in Internet availability
- 100 percent high-speed WAN availability across Pennsylvania
- $34 million in new private investments by telecommunications companies

**Wisconsin**

The BadgerNet Converged Network provides bandwidth to the school district or high school level in Wisconsin. School districts are then responsible for getting bandwidth to the other schools in the district. The average bandwidth to the district or high school for Internet transport was about 5 Mbps in May 2009. Many districts have purchased additional bandwidth from other sources. Major increases are being planned for this year, hopefully with the assistance of an ARRA Broadband Grant.

## BROADBAND AND DIGITAL CONTENT

**3. We seek comment on schools' and school systems' online and digital content needs and uses, including content for student instruction (e.g., whole or partial textbooks or supplemental resources) as well as professional development content for educators.**

**a. What sets of instructional and operational problems are schools and school systems attempting to solve with online content solutions?**

Education system needs high-speed broadband access for all to ensure that our administrators, teachers, and children have access to the technology resources available so that our children are competitive in the 21st century. There are many

proven technology solutions that are scalable, flexible, reliable, and have the ability to cost-effectively transform education for ALL students. In order to utilize these technology tools and resources to enhance teaching and learning, our administrators, teachers and students need high-speed broadband access for Online Assessments, Data, and Other Administrative Uses, Online and Distance Learning, Special Education Learning, Web 2.0 Technology Tools and Professional Development Opportunities.

Schools need high-speed broadband access to effectively create rigorous, technology-infused learning environments Students need affordable, high-speed broadband access at home to extend learning 24/7. Teachers need guaranteed, long-term access to high-speed broadband to enrich the curriculum to include technology applications such as videoconferencing and distance learning. Teachers also need high-speed broadband access for professional development, and engaging in professional learning communities as well as accessing new educational resources such as curriculum cadres and education portals. Administrators need high-speed broadband access to conduct online assessments and to access data for effective decision making. Students need high-speed broadband access in their schools to take advantage of a wide range of new and rich educational tools and resources available for anytime, anywhere learning. High-speed broadband access also aids in students' ability to overcome the digital divide in rural and low socio-economic areas.

Technology is, only now, becoming a truly integral part of almost every aspect of education. The array of digital content available to classroom teachers and students for classroom use is astounding. From lesson plans and student activities available from such sites as Thinkfinity (http://thinkfininty.org) and the Federal Resources for Excellence in Education (http://free.ed.gov) to primary resource from the Library of Congress and the National Archives, the content of education is increasingly digitized.

As we will highlight in below, technology offers professional development resources to teachers; opportunities to increase student engagement and achievement; individualize instruction based on sophisticated assessments; and methods to guide continuous improvement.

**Provide Ongoing Professional Development:**
Technology offers teachers the opportunities for professional learning by providing access to online collaboration, communities, and resources for learning anytime and anywhere. Without broadband, professional development can only occur with face-to-face instruction, which is typically expensive and hard to sustain.

**Examples**

- **Education Portals** offer a one-stop set of resources for educators, parents, and students to support teaching, learning, and leading. Portals provide

access to shared resources and create an entry point to other information or services. This one-stop shopping enhances professional development experiences by administrators, teachers and coaches with the online support anytime and anywhere. Portals often include: subscriptions, data systems, content standards, lesson plans, courses of study, research-based training resources, model classroom examples, engaging interactive media, Web resources, listservs, online portfolios, and other educational resources. A portal allows educators to quickly search for lesson plans or other resources by content standard, grade level, specific student and classroom needs, and/or topic. Education Portals in some instances may also provide access to online learning communities.

- **Online Courseware** provides teachers access to online courses. Teachers may have access to several clusters of courses. For example, in one cluster, teachers learn what types of curricula and learning principles will ensure students' success in the 21st century workplace and post-secondary education. In another cluster, teachers receive the skills and knowledge necessary to implement technology in the classroom through Web-enhanced lessons, project-based learning, and virtual field trips.
- **Professional Online Learning Communities** provide teachers across schools, school districts and states the opportunity to share resources, highlight strengths and gain support in weaker areas. The purpose of online learning communities is the opportunity for collaboration in a non-threatening environment and for teachers to learn and share without time or travel constraints.
- **Curriculum Cadres** The Alabama Best Practices Center designed a two-year professional development program that engages educators from participating schools in powerful conversations about 21st century learning. The Center established a virtual learning community built around an online curriculum called "Keeping Up with the Net Generation." http://www.bestpracticescenter.org/21stcentury.htm
- **Webinars** offer teachers access to often free or nominally priced methods of receiving professional development, however they cannot access the webinar without adequate bandwidth
- **eCoaching** offers the opportunity for cohorts of teachers to work, in real time, on real classroom instructional challenges through video conferencing, streaming of examples, and video models, of good instruction. Schools without adequate bandwidth cannot utilize this form of embedded and sustainable professional development because they cannot stream the video and other data.

**Early Intervention**

- READ 180, published by Scholastic, is an intervention program, currently serving approximately one million students in 15,000 classrooms across the country in all 50 states. 37 studies (including the federal government's What Works Clearinghouse) attest to its effectiveness with all adolescent student

populations, including students in special education and English language learners. Despite READ 180's track record, there are many districts that could benefit from the program but cannot support it from a technology perspective because m any district do not have sufficient bandwidth to allow for immediate (within a millisecond) student response necessary for the success of the intervention program.

**Increase Student Engagement and Achievement**

Students use technology in their everyday lives and it is important to understand how they are using technology. According to the research, a lack of student engagement is a predictor for dropping out of school even after controlling for student background and academic achievement (Rumberger 2004). Research shows that engaged students learn more, retain more, and enjoy learning more than students who are not engaged (Dowson & McInerney 2001; Hancock & Betts 2002; Lumsden 1994; Voke 2002). The Schlechty Center for Leadership in School Reform asserts that students who are engaged:

- Learn at high levels and have a profound grasp of what they learn
- Retain what they learn
- Can transfer what they learn to new contexts

Yet, according to recent student surveys, fifty percent of students reported being bored in at least one high school class every day. Seventy-five percent of students stated that they were bored because the material was not interesting (Yazzie-Mintz 2006). In another recent student survey, the perception that school is boring was cited as one of the reasons kids drop out of school (Bridgeland, Dilulio, Morison 2006).

- Social networking - 40% of middle school students and 67% of high school students have a personal websites (Facebook, MySpace, Xanga) and the most popular activity on those websites is emailing with friends. Over 50% of all high school students use email, IM, text messaging regularly.
- For schoolwork, students in grades 6-12 are using technology for these top 5 activities in 2007: Writing assignments (74%) Online research (72%) Checking assignments or grades online (58%) Creating slideshows, videos, webpages for schoolwork (57%) Email or IM with classmates about assignments (44%).
  http://www.tomorrow.org/speakup/speakup_reports.html

**Simulation**

- "Inanimate Alice" is the story of a young girl who grows up to become a computer game designer and animator. Each episode becomes more complex and interactive in keeping with Alice's age and skill level. The story contains puzzles and games, very simple to begin with, growing more complex along the way. It acts as a primer for computer games. Teachers in 57 countries have downloaded the Education Packs associated with the series. Teachers often use the episodes to ask their students what happens next. The students

use Powerpoint, Photostory3 and our own iStories software tool to create their own episodes. This interactivity develops considerable broadband traffic on a micro-scale. One school sampled indicated 36 students contributing 30 hours each to episode creation + teacher time + wiki development. On a macro-scale such interactivity would be significant.

- The Radford Outdoor Augmented Reality (ROAR) project augments reality curricula for elementary, middle and high school students by using handheld computers equipped with GPS to superimpose digital characters and images over a real physical place, such as a school playground or athletic field. http://www.radford.edu/mdunleavy/445/ROAR.html.
- Computer simulations of dissections and labs for K-12 and higher education software engage students with immersive and interactive 3-D simulations of anatomy and physiology. Systems often include audio narration, captioned text and realistic 3-D simulation to deliver key concepts within the theory and foundations of biology. View example: http://www.youtube.com/user/Setda1#play/all/favorites-all/0/PCY4_Hj5yaM

**Formative Assessment for Differentiating Instruction**

Utilizing smart assessment systems using technology to analyze each student's progress in a timely, personal and relevant manner provides an incredible return on investment. Through the use of technology, classroom teachers can conduct innovative micro-assessments of all students for the purpose of improving instruction. Formative assessment using technology provides new opportunities for the remediation or enrichment of each and every student helping all students reach their highest potential.

- **Alaska** - The Formative Assessment GLE Item Sampler is a statewide effort to develop a bank of formative assessments aligned to the Alaska Grade Level Expectations in math, reading, and writing for grades 3-10. These assessments are intended for use by all Alaska teachers to guide and adjust their instruction during the learning process and to differentiate classroom instruction so that the needs of each student are met.
- **Arizona** offers a formative assessment item-bank with more than 5,500 items aligned to Arizona standards located within their IDEAL (Integrated Data to Enhance Arizona's Learning) web portal http://www.ideal.azed.gov. They also have more than 100 premade pre and post assessments and performance objective snapshots aligned to Arizona Standards available to all teachers in Arizona.
- **Florida** - In Seminole County, Florida the district purchased handheld devices to conduct the DIBELS reading assessments in 2004. Scores are delivered in real-time, and after a button is pushed to sync the device, data is transferred to a secure Web platform that provides tools for analysis and data-driven instructional decision making. In addition, teachers, principals, and administrators can access a range of easy-to-read reports designed to deliver the data views educators need to track progress and understand what

resources and strategies are most effectively improving student outcomes. For the last five years, this focused system of data collection, analysis and intervention has led the entire Seminole County school district with 36 elementary schools to an "A" ranking according to the Florida Department of Education.

- **Texas** - Houston ISD in Texas is the largest school district in Texas and includes two large minority populations and more than 61,000 students whose first language is not English. This diverse student population presents unique educational challenges as the district strives to provide every student with the best possible education through an interactive core curriculum and specialized, challenging instructional programs. A top priority for Houston educators is finding ways to present information to students in a format and at an appropriate level that they can readily use and comprehend. Houston ISD uses the Lexile ratings for each student, and uses the readability ratings in netTrekker to find resources that meet the unique needs of every student, including their struggling readers and a large population of English language learners. The readability measures in netTrekker help the district's teachers more easily identify the most suitable digital resources for individual students.

**Online Assessments**

Schools and school systems are using online assessments through secure network connections to assess student understanding of content regardless of the delivery methodology. In 2007, 30.4% of school districts reported using online assessments in schools. Online assessments are being used for a variety of purposes: for low stakes testing that provides feedback to the student or teacher, in summative context for student grade promotion, and, in some cases, to facilitate state standardized achievement tests. These assessments often use multiple choice, limited response questions that allow for real-time, automated scoring and aggregation of results that can be analyzed in a timely fashion. Because of the varied usage, online assessments have been developed by a variety of sources—local participants in the classroom, district and state educational agencies, as well as private companies with commercial interest.

- **Louisiana** - Closing the Gap from Assessment to Remediation - The critical need for St. Mary Parish Schools, LA was to find assessment and remediation resources that aligned with the state's grade level expectations. The seamless integration of netTrekker and Scantron® Achievement Series™ allows St. Mary Parish teachers to immediately connect to digital resources for re-teaching based on assessment data. By clicking on the netTrekker icon in Achievement Series, the teacher goes from the identified area of deficiency to supporting standards-aligned resources in netTrekker, which facilitates differentiated instruction within a class and among various classes based on actual test results.
- **Virginia** - Virginia's Web-Based SOL Testing - This initiative started with the goal of having schools use Web-based systems to improve the instructional,

remedial and testing capabilities of Virginia's Standards of Learning (SOL) state achievement tests. To meet this end, the state hopes to administer all SOL tests via the Internet by 2009. The online version of the test is exactly the same as paper-pencil version of the test; the format is the only aspect that differs. The administrative benefits gained from delivering online SOL tests include less administrative time required to record student demographic data; improved test monitoring capabilities; web-based reporting of student test results and reduced turnaround time to receive student test scores resulting in potential increases in instructional time.

**Rigorous and Relevant Content**

Quality electronic learning resources – in addition to being learner appropriate, aligned to state standards, and built around effective pedagogy and instructional design – can provide the following educational benefits, a number of which are sometimes provided in a parallel way by print-based resources: engage students through multi-media, interactive content adapt to support differentiated or personalized learning for students with alternative learning style, pace or needs; keep knowledge current and information accurate; enhance accessibility for physical or learning disabled students through assistive technologies and presentation of content in alternative modalities; and support accountability needs through integration of assessment, content management and alignment, classroom management and other courseware tools.

Electronic learning resources also provide a number of practical benefits, including: accelerated delivery and access; increased portability (size, weight, etc.); and enhanced flexibility in meeting evolving and diverse curriculum needs.

In addition to these instructional and practical benefits, education technology is increasingly important in light of the changed learning needs and styles of today's students. Today's students matured in a digital world and are masters of technology. They seamlessly integrate multiple technology tools and digital resources into their daily lives, but are too often forced to leave these skills and aptitudes at the classroom door. As a result, students are increasingly disengaged in school, forced to adapt to a learning process and medium that stands in contrast to that which is most comfortable and successful for them.

**Example: Virginia Flexbook Project**

The Commonwealth of Virginia and the CK-12 Foundation formed a partnership in which CK-12 produced a "flexbook" where CK-12 provides the software platform and technical support while Virginia provides the physics content of the flexbook. A "flexbook" is a flexible or adaptable textbook available for free on the Internet. The flexbook, while more formal than a simple wiki, allows teachers to develop curriculum as book chapters and do it in either a simple markup language or Word. The pilot flexbook, titled, "21st Century Physics Flexbook: A Compilation of Contemporary and Emerging Technologies". The flexbook differs from a traditional text in several ways:

- It is licensed as Creative Commons (CC-BY-SA) making all content freely available to the reader.
- Readers can use chapters as they are, modify them by adding material from other web resources or removing material – rip, mash, and burn!
- Chapters are not of a single voice or style but rather reflect the unique voice of each author – a focus on technical editing rather than homogeneity of form allowed for the rapid publication.
- Chapters are not all written at a uniform reading level – this reflects the broad make-up of the contributors: high school teachers, college teachers, working physicists.
- It can be updated with additional or corrected material quickly with the newly updated version freely and immediately available to all. For example, new discoveries from the Large Hadron Collider or the recent controversy regarding the planet Pluto can be inserted as they occur.

**b. Of the typical set of online content tools (e.g,: content creation, content publishing, content indexing, content management, content search) what have schools and school districts experienced when making purchasing decisions about the quality and availability of tools that meet their needs? Are there areas where needs are consistently unmet or under-served?**

Nationally, there is a need for a clearing-house for best practices, critical policies, and research on the use of digital content; and we also need a strong dissemination mechanism to share what is or is not working and to recommend how digital content plays a role in the transformation of our education system. There are a plethora of solutions and options. The key is to ensure schools have the technology infrastructure, bandwidth, professional development, vision, etc. to understand their needs and be able to address those needs. Educators will then be better able to drive demand for development of every improving tools to meet their needs. Multiple tools are needed to meet diverse education needs that vary, including from district to district.

Teachers have long integrated textbooks with other print and digital materials. This is not easy, and is done both by the teacher and with some digital resources that often reference textbook pages and chapters, or visa versa. Digital has historically been supplemental due to limited student access, school infrastructure, and teacher capacity, etc. As changes occur, digital will more become the core material. Integration among and between digital resources is much easier as the technology eases practical mgt and navigation issues for teacher and student.

**Digital Content Barriers:**

- **Access:** Insufficient access to technology and bandwidth in schools and at home
- **Vetting and Adoption Processes:** In the 22 textbook adoption states, the vetting and adoption process varies significantly. In most cases, it is an

arduous, drawn-out process that discourages many publishers from participating. Those who do participate are often subject to arbitrary and capricious decision-making that can be harmful to publishers' businesses as well as school districts. The vetting and adoption barrier is different in non-adoption states, but in many districts, no less of a concern.

- **Business models**: In many adoption states, a large portion of money for instructional materials is tied up in the adoption process. The lack of flexibility is a concern.
- **Intellectual property rights**: Many current models for content development the use of intellectual property is not flexible enough to include buying and selling materials. Older models that include complex contracting processes can impede the distribution of some instructional materials.
- **A fragmented market:** The education market for instructional materials is highly fragmented and requires publishers to develop for at least 50 different state content standards, not to mention other requirements that states or districts may tack onto a call for content or an RFP. This makes development of materials much more costly.
- **Complexity of a transition**: The environment educators and publishers are facing is complex: publishers trying to address every type of teacher with a vast array of materials; districts with varying levels of technology access and expertise, the more advanced of them demanding materials that do not fit an old model; and a 50-year-old business model for the purchase and use of instructional materials.
- **Lack of Funding**: Insufficient funding for developing content
- **Curriculum:** Curriculum is tied to age-old subject areas driven by high stakes testing required by NCLB.
- **Professional Development**: Lack of on-going, high-quality professional development

**c. How is digital content being integrated with traditional textbooks and other materials? Are there issues preventing this integration?**

Similar to the Virginia Flexbook example above, schools, districts and states are working to incorporate digital content so that it complements the and enhances the core curriculum. Several states including California, Florida and Indiana have recently revised their textbook policies to include digital content.

- **Indiana Textbook Policy** An Open Letter to Indiana Educators about Textbooks, Computers and Instructional Materials - Indiana's students deserve effective instructional materials from which they can learn. This applies both to content and to format. You should feel no obligation to utilize the standard form of social studies textbooks. To the contrary, we urge schools to move cautiously and not adopt social studies textbooks without giving thought to what book or other instructional materials can best help bring social studies to life. We continue to encourage local districts and

educators to make content decisions that are premised on presenting material that both aligns to the state's subject matter standards and engages students' interests, that detail the complexity of the human experience and elicit richer student consideration of the history, values and principles important to the meaning of America, its past and developing place in the world and the fabric of its culture. This is critically important in United States history as a foundation element of educating students toward good citizenship. We believe the same principles apply in other curriculum areas as well. The State Board is required by statute to adopt textbooks for use in the state if they meet very minimal criteria. Yet, after giving its local advisory committee an opportunity to provide its recommendations, "Textbook" means systematically organized material designed to provide a specific level of instruction in a subject matter category. The State Board interprets this section to allow school corporations to use computers and other data devices, instructional software, internet resources, interactive, magnetic and other media, and other "systematically organized material." As technology continues to evolve, Indiana's broad and inclusive definition of a textbook will enable districts to evolve in their use of such materials, whether packaged for them or packaged by them.
http://www.doe.in.gov/olt/textbook/welcome.html

- **Indiana District Example***: Replacing Textbooks with Dynamic, Engaging Content* - Bartholomew Consolidated School Corporation, IN. The Director of Technology, Director of Secondary Schools, and Social Studies Dept. chair wanted a 21st century social studies solution that's more inspiring, more dynamic, and more engaging for today's digital students. They saw the potential to transform social studies into the 21st century – the content is timely and dynamic. The district chose online resources over textbooks – and chose netTrekker to deliver them. Students have choices about how they access the information – their path to learning is not limited to the textbook. The conversion from textbooks to netTrekker is taking place during the 2009-2010 school year, and will affect 4500 social studies students from 7th – 12th grade. Now that they have made the transition for their social studies classes, the district has a ready solution for the rest of the curriculum too, as they expect additional textbook waivers for other subjects in the coming years
- **Michigan:** At several high schools in Michigan, teams of high school students with a teacher mentor constructed a web-based digital storybook lesson utilizing Michigan's Educational Technology Standards. The teams researched various technologies to construct digital studios and then created digital storybooks. Once completed, the teams shared their productions with the elementary schools, providing another technology resource for the district to use.
- **Oklahoma** - The initiative is known as 24/7! in Stidham Public Schools, Oklahoma, (K-8) began offering certified instruction in digital format. What this means is that Stidham certified instructors began recording both the

audio and video portion of their lectures in core subject areas (Math, Science, Social Studies, & English) via their interactive white boards which were purchased through the Title II Part D Grant Stidham received during the 07-08 school year. These lectures are available for all students (grades PreK - 8) at school via our network and also on the Internet via our teacher's websites. This is a revolutionary concept that will begin to change the educational landscape forever! The Academic Performance Index has steadily increased over a four- year period. As a result of the competitive grant, the API has increased from 1197 to 1383, a difference of 15.5 percent. http://www.stidham.k12.ok.us *Title IID Grant*

**DIGITAL LITERACY**

**4. We seek comment on digital literacy programs, standards, and content.**

The vast influx of information and multimedia in our schools and home has made the question of ICT (information, communication, technology) fluency a moving target. Consistent access to new learning experiences through media such as television and the Internet has changed the paradigm of student learning. Kids today have access to media and information 24 hours a day/7 days a week. Therefore, learning does not happen only eight hours a day within the school building as it did for a majority of students in past generations. This shift poses many opportunities to develop life long learners with creative, innovative approaches to solving problems—now and in the future. It also poses challenges as our schools struggle to stay ahead of this ever-changing landscape. In a survey conducted by SETDA in December 2006, 38 states responded to questions regarding their approach to media literacy. The survey showed that while media literacy may have many different names, the knowledge and skills that are a part of this literacy are important across the nation. Specifically, much effort is being put toward developing standards and policies that keep our students safe online, providing them with technology skills, and utilizing communication and information in the most productive ways. While much effort focuses on information and communication skills, varying levels and approaches have been underway across the states. It is important to have a collaborative effort to successfully address the overarching goal of developing students who leverage all the technology, communications, and information.

**5. We seek comment on online learning systems.**

**ONLINE LEARNING SYSTEMS**

Online learning can meet a variety of school and students needs. Broadband access can provide students in rural areas with access to teachers, students with special needs the opportunity for alternative learning environments, and students the ability to work at his/her own pace. Data suggest that in about six years 10 percent of all courses will be computer-based, and by 2019 about 50 percent of courses will be delivered online. Michigan and Alabama recently passed legislation to require all

students to complete an online course as part of high school graduation requirements. Access to broadband Internet access is essential to allow allow all students to participate in online learning.

**a. Please provide examples of schools and school systems currently supporting blended online/offline instructional planning and delivery as well as distance learning via broadband and computer-based learning. What online content systems (e.g., online text books, resource libraries, learning management systems (LMS), distance learning programs, student portfolio systems) have been successfully implemented? How do schools and school systems align online learning systems with other traditional instructional tools (e.g., textbooks, curriculum, scope and sequence)?**

- **Florida** - Palm Beach County Schools, FL, recently rolled out an online teaching tool that's helping teachers collaborate with each other and, ultimately, with their students. Powered by My Portfolio, the K-12 "safe search" tool, allows educators to create, organize and share content for standards-based instruction with fellow teachers within the district. My Portfolio is used by both individual teachers and district curriculum staff to create project-based learning activities and units for standards-based instruction. Educators are using the solution's customized features to scaffold, save, and share digital content. Through the system, the district is able to provide a variety of safe searching tools to both students and teachers.
- **Michigan** - The Michigan Virtual School™ provides high school and middle school students with a variety of course options that they wouldn't otherwise have access to. All courses are taught by certified teachers, and students can learn anywhere, anytime. MVS works with local schools to supplement availability of courses and does not directly grant credits or diplomas. MVS is state funded and operated by the Michigan Virtual University ®, a private, nonprofit corporation.
- **Ohio** - eTech Ohio has implemented a program to provide online professional development courses for all Ohio PK-20 educators and professionals. These are anywhere, anytime, asynchronous courses with eTech Ohio certified facilitators. Facilitators are online on a daily basis to respond rapidly to the needs of participants. In many cases, graduate credit is obtainable by teachers who take the courses. http://etech.ohio.gov/programs/elearning/

**ACCOUNTABILITY AND REPORTING SYSTEMS**

**6. We seek comment on schools and school system implementation of online/ASP/cloud-based student instructional data reporting systems and their impact on student achievement and school operations.**

SETDA strongly supports the use of online instructional data reporting systems when the assessments are part of an integrated instructional plan that includes resources for individualized instruction. Data systems should support instructional technology in the classroom.

**EDUCATIONAL DATA INTEROPERABILITY**

**7. We seek comment on data interoperability projects utilizing the Internet and/or wide area networks (WANs). Such interoperability projects could include student record transfer solutions between enterprise software applications within a single organization, or inter-agency data transfers.**

Education agencies across the US have significant investments in various software programs and databases. However, for all the installed software and data captured, most agencies and schools still struggle with data interoperability—the sharing of student, staff, course, assessment, etc data between disparate software applications and physical sites. The interoperability challenge is insurmountable without the access to the Internet and/or wide area networks (WANs). Standards-based interoperability offers the preeminent solution for data sharing in the 21st century. We advocate states embrace the undisputed educational data standard, the Schools Interoperability Framework (SIF). SIF allows state, regional and local education agencies to:

- Close the gap by integrating student, staff and course data across applications and physical sites.
- Protect existing technology investments in expensive applications software
- Gain access to timely, accurate information when and where it's needed.
- Save time, effort and expense while gaining new, powerful capabilities from more timely data, more accurate data and better-integrated data.

**a. How effective were these projects?**

SEAs, including VA, WY, CA, OH, and more are using WAN-supported SIF interoperability to generate and share student an staff IDs, and for Vertical Reporting of legislatively mandated testing.

**Wyoming:** The Wyoming Department of Education has experienced numerous benefits. Each school district has realized both improved data quality and staff efficiency. In practice, data-entry staff in a school district enters the information once and it appears in all applications asking for that information. As one school district states, "staff like it better and we want all of our applications using SIF." For state reporting, the number of reports has been significantly reduced. Twenty-three aggregate reports have been eliminated which in turn has reduced eight hours per school district per report; equating to reduced reporting per school district of

70,000 hours per school, 18,000 hours per district and an estimated state report savings of over $1.7 million!

Finally, information from the state department of education is automatically provided back to the local school district in a timely and accurate fashion. With SIF interoperability, schools have been accustomed to the immediacy of data exchange; in one example, when the Student Locator Framework was temporarily offline, the districts became upset because the student identification information was not automatically populated back to the local SIS from the state.

**b. What metrics were used to define the projects?**

- Number of manifests moved electronically
- Number of reports submitted electronically
- Time savings for automated data collection and certification
- Data integrity

**c. What barriers or issues have prevented implementation of such solutions?**
Typically, funding is the main issue that prevents the implementation of such solutions.

**d. What security systems were implemented and were they effective?**
The security model of SIF standard centers around three areas: encryption, authentication and access control. Various communication protocols, over which SIF data may be transferred, including SIF HTTPS, provide built-in support for easing the implementation details of guaranteeing encryption and authentication requirements. HTTPS is the gold standard in online data security, used for online banking and other financial transactions.

**COMMUNICATION AND VIDEO SYSTEMS**

**8. We seek comment on implementation of other online applications in schools and school systems.**

a. **How have communication tools like instant messaging and online video conferencing supported instructional program implementation?**

Video conferencing and online chats and webinars offer schools and districts the opportunity to provide high-quality professional development at a reduced rate, collaborate with schools throughout the world on specific content projects including experiences such as virtual field trips.

**Examples**

- **California:** The Enhancing Education Through Technology Competitive grant award in Round 3 allowed the three district middle schools (Adams, Helms

and DeJean, in California) to decrease the student to computer ratio in 7th grades math classrooms to 10:1. Teachers were able to stream video math lessons that helped reinforce traditional classroom learning. Students used on-screen computer tools and manipulatives to make mathematical concepts more concrete and to actively engage with the material, rather than being expected to passively absorb information. When some students experienced difficulty with complicated algebraic curves, known as parabolas, teachers photographed those they saw in nearby architecture. Students imported the digital pictures into computer programs to graph the parabolas; then, armed with digital cameras, the students went off-campus to find and photograph their own examples and gained a much deeper understanding of that concept. Students were also able to logon to the districts learning resources network after school hours to enhance their proficiency with additional tutorial exercises. This also enabled parents to see what their child was doing. This program not only energized the teachers and engaged the students but test scores improved and dropout rates decreased.

- **Oregon:** The LIVE-C - Learning through Interactive Video Experiences at Three Rivers School District in Oregon (Grades 1-12) was designed to bring the world to the geographically isolated, culturally limited and high poverty students of Three Rivers School District through the use of mobile interactive video conferencing (MIVC) equipment. Teachers are able to invite in experts from around the world to enter their classrooms as co-teachers, as well as connecting their students to students around the globe. LIVE-C is a simple concept, but powerful because it utilizes the most fundamental aspect of human learning – human interaction. Fifth grade Reading/Lit Statewide Assessment scores at Fruitvale Elementary rose from 61.4% in 2006/2007 of students meeting or exceeding the standard to 95% 2007/2008. In math, 86.7% of students met or exceeded in 2007/2008, up from 63.6% in 2006/2007. Gains were also noted at other elementary, middle and high schools. *Title IID Grant* http://www.soesd.k12.or.us/News.asp?NewsID=278
- **Vermont:** The Learning Network of Vermont (Essex Caledonia Supervisory Union) is a statewide videoconferencing project funded by Title IID. It is built on infrastructure from a past initiative, the Interactive Learning Network, and utilizes IP protocols to connect schools around the state via video conferencing. This year included the acquisition of fee-based content that is supported by Title II funds and allows schools to bring high quality content into school classrooms. There are 40 schools currently connected and conferencing for meetings, state events, and classroom-to-classroom connections. http://www.learn.vermont.gov/ *Title IID Grant*

**b. Where have live video streaming programs been implemented to scale?**

- **Alabama:** Through EETT Formula funds, Collaborative Distance Learning, Huntsville City Schools, in Alabama, have increased and enhanced distance learning opportunities allowing the district to provide a more comprehensive curriculum, share resources and experiences across cultures, and offer enriched collaborative experiences. Huntsville City Schools provide distance-learning capability in all of our 48 schools and centers through the use of interactive video conferencing (IVC), online courses, social networking and collaboration using webcams. In 2007-2008, the district conducted 108 distance-learning virtual fieldtrips to 2,364 participants and fourteen high school classes were offered to students via IVC and online course work. According to the state technology survey: educators fostering and nurturing an environment that supports innovative uses of technology increased from 22% in FY07 to 25% in FY08. Distance learning opportunities, provided to enhance learning and access to curriculum content, increased from 17% in FY04 to 100% in FY08.

**c. Where have social networking tools been implemented to support instructional goals?**

- **Arizona** - Arizona's IDEAL Portal The state-provided teacher web portal IDEAL v2.0, contains multiple Web 2.0 tools, including assess to Goggle Apps and iTunesU. Access to professional development, standards based curriculum resources, collaborative tools and school improvement resources and is a single access point to educational resources and information for all Arizona Educators.
- **California** - California Schools, teachers, and students actively employ Web 2.0 tools. Some teachers share lesson plans and photos through the file depository; others have developed informational podcasts that parents can subscribe to. The district even provides students with their own password protected online community and blog. http://webapps.saugus.k12.ca.us/community4students/
- **New Hampshire** - The Office of Educational Technology at the state education agency began using blogs and wikis for information dissemination and as a model for other DOE staff to follow. This year OET will use a wiki to engage in a statewide dialogue as it crafts the next State Educational Technology Plan. Online resources at www.nheon.org/science and www.nheon.org/opennh
- **New Jersey** - Perth Amboy Public Schools – Perth Amboy High School, NJ "Raritan Watershed"—Students collect and conduct tests on water samples. They compile data electronically and exchange information with other schools online. Results are discussed on Wikis, and multimedia presentations are prepared to illustrate results and conclusions. Before this program was implemented, none of the students received a score of three or higher on the AP Environmental Science exam. After implementation, 30-40% of the students have received a score of three or better.

- **Washington** - Students learn problem-solving skills from each other, versus simply memorizing answers. Information is shared through the school's interactive wiki. Students interact with each other to solve problems collaboratively, but they are also interacting with students around the world, including students in Kenya, Ecuador and Indonesia. http://t56linc.com/moodle/

**COLLABORATION AND COMMUNITY SYSTEMS**

**9. We seek comment on implementation of collaboration and best-practice-sharing online systems. For example, we have been directed to a number of systems, which demonstrate features of collaboration or online community capabilities including: www.curriki.org, www.nylearns.org, www.oercommons.org, www.schooltube.com, www.boepilot.org.**

Several states have utilized an education portal as a hub for state-wide professional development on how to improve teaching and learning with technology, as well as creating professional learning communities where teachers can share and vet high quality lesson plans, content, and ideas. States can extend on-going and sustainable professional development opportunities to teachers and administrators in more states with similar programs. State examples such as the programs below require dedicated state leadership and cross program collaboration.

- **Alabama -** Alabama Learning Exchange (ALEX) offers resources linked to the searchable Alabama Courses of Study including: Courses of study, Web Links, Lesson Plans, Search, Personal Workspace, Professional Learning, Distance Learning. These resources are designed to engage students and teachers in 21st century learning, and expand new opportunities. Parents also have access to ALEX so that they can help their child meet school expectations at home. ALEX averages about 34,000 individual teachers visits monthly. http://alex.state.al.us/index.php
- **Arizona -** Integrated Data to Enhance Arizona's Learning (IDEAL): IDEAL is Arizona's web portal where educators can access educational resources and services with the ultimate goal to increase the academic achievement of all Arizona students and to support school improvement efforts throughout the state. Through a single sign-on, educators enter a web environment and can access a vast array of online resources including: online professional development, a 4,000 plus streaming video library, online high stakes practice tests, Google apps, iTunesU K - 12, an online school improvement planning tool and related resources, formative assessment test item bank and 100+ pre-made quizzes fully aligned to Arizona Standards. IDEAL represents the commitment and dedication of the Arizona Department of Education and Arizona State University to offer online resources that support high quality teaching and that provide an engaging, technology-rich learning environment for all Arizona students. http://www.ideal.azed.gov/node

- **California** has a robust K-20 research and education network infrastructures. The network was built and is maintained by the Corporation for Education Network Initiatives in California (CENIC) on behalf of participating public and private educational institutions. The K-20 network, known as the California Research and Education Network (CalREN), serves the state's public and private institutions of higher education and the vast majority of the K-12 education community. These entities connect to each other and to educators across the U.S. via similar research and education networks in other states.
- **Indiana -** *The Learning Connection* (http://learningconnection.doe.in.gov) is a newly developed system for Indiana educators (first released on 10.27.09) providing access to longitudinal student level achievement data, digital teaching and learning content and curriculum design tools**.** Also included in The Learning Connection functionality is a strong set of professional collaboration tools that will allow any teacher to collaborate with any other teacher in the state. Any Indiana teacher can sign up whenever they'd like, and when schools enroll through an easy process, additional features become available including student-level data access and reporting capabilities as well as parent and student access to classroom assignments, grades, and historical performance.
- **Massachusetts** Online Network for Education (MassONE) is the Commonwealth's set of web-based tools and resources designed to support PreK–12 standards-based teaching and learning in Massachusetts. MassONE brings together all of the Massachusetts students, teachers, and Department of Education staff into one online community. MassONE makes it easy to communicate and collaborate, share educational resources and augment classroom instruction safely and securely. MassONE offers a searchable collection of all state curriculum and vocational technical education frameworks, providing a convenient way to align existing resources with the frameworks. Educators can search by discipline, grade level, strand, and topic to locate specific standards.
- **iTunes U K12** provides free content for K12 educators and this initiative creates a destination where professional development, curricula resources, examples of best practices and student samples are easily accessible. State sites work to vet content and align content to state standards. Educators and students only need an internet connection and to download the free iTunes U software to access the resources from school or at home. Recently, Ohio's iTunes U site has reached one million downloads attaining that milestone in just eight months. iTunes U sites include digital media resources and content providers include school districts, museums, state parks, libraries, public television and universities.

**INNOVATION IN BROADBAND AND ONLINE SYSTEMS**

**10. We seek comment on opportunities for government to support innovation in the education technology sector, both in terms of driving innovative program and product development, as well as driving adoption.**

The federal government has the opportunity to continue to support educational technology program that offers states the opportunity to develop innovatative, research based best practices to address the needs of their students. Innovation and program development requires critical support at the state level.

**Example:** In Arkansas, the Jonesboro Public Schools implemented the S.M.I.L.E. (Students Meeting ISTE Learning Expectations) project designed to create technology literacy for students in grades 5-9. This program assists students with academic skills in literacy, math, and science through electronic project-based activities—exploration, information, and research; comprehension and summarization; data collection, analysis and presentation. An audit of students' electronic portfolios in March 2008 revealed that technology literacy increased. www.jps.k12.ar.us *Title IID Grant*

**E-RATE MODIFICATIONS Questions 11-13**

E-Rate should be modified to provide sufficient bandwidth to schools so that ALL students can access the wide range of educational technology options available to enhance learning and increase achievement. Specific goals include:

- Keep E-Rate as part of the universal service fund
- Advocate that policymakers update the universal service program to increase available funding
- Provide administrative funds to states to encourage states to have a state-level E-Rate Coordinator
- Simplify and streamline the E-Rate application and approval process to be consistent with the amount of the funds awarded.

**OPEN CALL**

14. We seek any additional case-studies, research and other evidence that may provide additional insight into the types of questions asked in this document.

Please review the research papers submitted by SETDA:

- Broadband Access for All Kids: Breaking through the Barriers
- Science, Technology, Engineering, and Mathematics
- Technology-Based Assessments Improve Teaching and Learning
- Empowering Teachers: A Professional and Collaborative Approach
- Learning Virtually: Expanding Opportunities

**Other Resources:**

A Blueprint for Big Broadband, An EDUCAUSE White Paper, January 2008, p.54, http://www.educause.edu/ir/library/pdf/EPO0801.pdf

Speed Matters: Affordable High-speed Internet for All, http://files.cwa-union.org/speedmatters/SpeedMattersCWAPositionPaper.pdf

Congress on Content: http://www.contentcongress.com/HearingResults.aspx