Appendix

A Resource Guide Identifying Technology Tools for Schools

SETDA

Title I NASTID

September 2009

Introduction & Acknowledgements

SETDA and NASTID's "Technology Tools for Schools Resource Guide" provides definitions of key technology components and relevant examples, where appropriate as a glossary for educators. The guide also presents essential implementation and infrastructure considerations that decision makers should think about when implementing technology in schools. Technology enhances administrative, teacher and student capabilities and performance, especially for those students who lack access to technology outside of school.

The Guide is organized as follows:

- School Technology Structure
- Classroom Components — Computing Devices
- Classroom Components — Hardware
- Classroom Components — Content, Courseware, and Creativity Tools
- Online Collaboration and Communication Tools
- Online Editing Tools
- Essential Implementation Considerations
  - Technology Planning
  - IT Support
  - Digital Citizenship
  - Data Systems
  - Professional Development
  - Student Assessments

For additional details and examples, please visit: *The Leveraging Title I & Title IID Partnerships: Maximizing the Impact of Technology in Education Guide.*
Join the online discussion and share your examples at: http://www.setda.org/web/guest/titleIwiki

Credits

Writing
Christine Fox, SETDA
Rachel Jones, SETDA
Layout
Catherine Immanuel
Cover & content images — istockphoto.com

Special Thanks to the Following SETDA and NASTID Members for Their Contribution to this document.

Richard Long, Executive Director, NASTID
Mary Ann Wolf, Executive Director, SETDA
Kathleen Barnhart, Illinois Department of Education
Geoff Fletcher, Emeritus, SETDA
Rick Gaisford, Utah Department of Education
B.J. Granbery, Montana Department of Education
Sara Hall, SETDA
Karen Kahan, Texas Education Agency
Carla Wade, Oregon Department of Education
Brian Wright, Wyoming Department of Education

September 2009

School Technology Structure

Schools may implement technology in a variety of ways, and a few of the methods for implementing computing in schools include:

Centralized Computing Stations: Four to five computers in a classroom setting enable students to work in small groups, conduct independent research, and save their work to individual folders or personal storage devices.

Mobile Computing Lab: Laptops are shared among many teachers and signed-out in advance and are sometimes referred to as COWs – Computers on Wheels.

One-to-One Computing: Each and every student in the classroom has access to his or her own computing device.

- Maine's Learning Technology Initiative (MLTI) provides one laptop per student and teacher in all middle and high schools in the state and provides teacher and administrator professional development and technical support. Academic achievement results included increase in writing standard from 29% to 41.4% (after year 4). Also, economically disadvantaged students outperformed economically advantaged students in some situations.

Classroom Components — Computing Devices

In a 21st century learning environment classrooms are well equipped with computing devices that provide teachers and students access to software, online resources and digital content. In addition to laptop or desk top computers, classroom computing devices and program structures may include:

Mobile Devices: Mobile devices are pocket-sized computing devices and may include cell phones, PDAs, etc. Mobile devices are convenient and easy to take anywhere and are often less expensive than a personal computer.

- **Smartphones:** North Carolina: Project K-nect program in Jacksonville, NC. Over 100 Smartphones were distributed to 9th grade Algebra I students in Onslow, Durham, and Winston-Salem/Forsyth Schools to measure their achievement in using these tools for advanced purposes. The highlight of the program lies in the ability of each phone to act as a resource to students, allowing them to connect to other students, their teachers, and participants with the program. Tools available to the student included a closed instant messaging system, allowing them contact with only those involving with the program, a series of problem sets created by the Math Forum, and blogs, allowing the students to post questions and provide support for other students. http://www.setda.org/web/toolkit2008/student-engagement/technologytools#Chats

Netbook: A netbook is a lightweight subnotebook computer with a low-powered x86-compatible processor (compatible with PC standard software), small screen (no larger than 10 inches), usually small keyboard and wireless connectivity.

Thin client: A thin client is a client computer or client software in client-server architecture networks, which depends primarily on the central server for processing activities.

Classroom Components — Hardware

Audio System/Classroom Amplification Systems: Classroom amplification systems usually include a receiver, an IR sensor and speakers to mount on the ceiling or walls. Lightweight, wireless, and wearable microphones are typically included to enable teachers to move freely around the classroom while speaking at a conversational level to save their voices. Sound is distributed evenly throughout the classroom so all students can hear the lesson, no matter where they sit.

Value: When students can hear lesson content clearly in the classroom, they are more successful at listening tasks and at learning in general. Classroom amplification systems offer a simple and economical way to improve classroom acoustics, save teachers' voices, and enhance student engagement and performance. Classroom amplification systems are particularly important for younger and ESL students who are developing vocabulary.

Example: In DePere, WI, teachers noted positive improvements in student behavior when using an amplification system and that the students enjoyed using the microphone, increasing student engagement.

Digital Video and Still Camera: A digital camera (or digicam for short) is a camera that takes video or still photographs, or both, digitally by recording images via an electronic image sensor.

Value: These devices help students and teachers bring creativity, project based learning and teacher, student, or class created material into the curriculum.

Example: In Adams, Helms and DeJean school districts in California as part of an initiative to increase math scores through the use of technology, classes were provided digital cameras and 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. The program not only energized the teachers and engaged the students, but test scores improved and dropout rates decreased.

Document Camera: Document cameras are used to project everything from historical artifacts to items brought to class for show-and-tell. Science teachers employ them to demonstrate proper lab procedures; math teachers have students use them to share problem-solving tips. And most teachers appreciate being able to read from a book that all students can see. This device works in conjunction with a computer, projector, interactive whiteboard or independently, and can sometimes be integrated with the collaborative learning software.

Value: Document cameras provide teachers with an opportunity to transform any object into digital content and to make many of the existing resources like worksheets, articles and traditional overhead lessons more interactive than a traditional overhead projection device. This is a valuable tool in almost all subjects. Old texts, artwork, a dissected frog, and 3D models all can be enlarged to show one example to the entire class using a connected projector. All digital content can be captured into a software application for future review. Document cameras can also be used as a "webcam" for video conferencing or capturing the lesson via connected computer to be used as a podcast for other classes.

Example: In Newport News, Virginia, schools used document cameras in the editing of student writing. Students placed their rough drafts on the camera, and class members would read the writing and offer editing suggestions, such as spelling and grammar corrections, rearrangement of sentences, and noting the absence of introductory or concluding sentences. Students that were normally very shy about having a peer edit their work surprisingly enjoyed having the entire class offer suggestions.

Interactive Whiteboard: (IWB) A large display board comes with accompanying software and connects to a computer and projector to enable interactivity. The projector displays the computer's desktop on the board, and teachers and students control the computer touching the IWB using a pen, finger or other device, such as a tablet or remote control. The ability to touch varies. Some IWB software tools record and save lessons that can be viewed by students who missed a class or by students who need repetition and review. Interactive whiteboard software (also known as collaborative learning software) allows teachers to create, deliver and manage lessons within a single application.

Value: IWBs help teacher efficiency in future preparations and enable students who miss a class or need repetition to review recorded lessons. A research review by the British Educational Communications and Technology Agency shows that interactive whiteboards in the classroom result in: increased student engagement and motivation; greater opportunities for participation and collaboration; improved personal and social skills and self-confidence; greater progress in mathematics and science for students in years; accommodation for different learning styles; and improved attainment for students with special needs

Example: In Lincoln Elementary, Mt. Lebanon School District, PA chapter tests were used to assess the impact of the interactive whiteboard, student responses systems, and interactive software on student learning in Math. In classes where the interactive whiteboard and student response systems were used, average test scores were more frequently higher when compared to the other classes.

Learner Response Devices: Learner response devices are a class set of devices, which supply learner response data to a common classroom display. Included are "clickers" which provide teachers with real-time multiple-choice test data; alphanumeric input devices which allow for a more detailed response; and classroom-networked graphing calculators which allow teachers to view student coursework, check problem solving techniques and guide performance. Each student is provided a device. The teacher can prepare in advance informal pre/post tests to track student progress, build informal assessments in advance or "on the fly" to analyze where students excel or struggle or use common classroom display for collaborative learning.

Value: Learner response devices encourage an interactive teaching approach, which provides real-time data about student understanding. Educators have also found these tools to increase student engagement and participation. They also appreciate the opportunity to adjust lessons with access to instant, accurate student feedback.

Examples:

- **Graphing Calculators:** A Virginia Commonwealth University meta-analysis of 54 high-quality studies concluded that graphing calculators can be an important factor in helping students develop a better understanding of mathematical concepts, score higher on performance measures and achieve a higher level of problem solving skills. Research results from the TI MathForward program, a program that extensively uses graphing calculator-based learning response devices, has shown that participating students have demonstrated significant achievement gains on state mathematics assessments and has helped close the achievement gap for African American students.
- **Student Response Systems:** In Kissimmee, FL, students were actively engaged in their learning, learned from each other's mistakes anonymously, and gained insight from the various ways the teacher re-represented the curriculum when using student response systems. The student response system allowed for immediate responses and with feedback, the teacher was able to ensure students were mastering the material. According to the data gathered, grade level equivalency growth from grades two to three was 30-36%, whereas growth from third to fourth grade was 52%. Data gathered on a group of fourth grade students utilizing a school-wide standardized test in math, GMADE, proves that the use of SRSs is a valuable and beneficial resource to have in a classroom. (Rovnak, P. (2009). "A Thesis Presented to the Faculty of Full Sail University" Reedy Creek Elementary School. Kissimmee, FL)

Portable Media Players: Portable media players are consumer electronics device that are capable of storing and playing digital media audios and video. Data is typically stored on a hard drive, microdrive, or flash memory.

Value: Engage students with different learning styles and provide access to content in a variety of ways anytime, anywhere.

Example: In Union City, New Jersey, a Media Specialist has won numerous awards for her "Pod People" using iPods to teach English to special needs and bilingual students. She used music stored on iPods to teach and practice reading, writing and listening skills. The Media Specialist used song lyrics to teach grammar, music, ethics and reading comprehension and the iPod recorder for honing diction and speaking skills. http://www.setda.org/web/toolkit2008/student-engagement/technologytools#Podcasting

Portable Storage Device: A portable storage device (PSD) also known as "flash drive" or "thumb drive" is a small hard drive designed to copy and store digital content.

Value: Portable storage devices are a cost effective way of providing each student with ample space to save his/her work and build a portfolio of artifacts.

Printer: At least one printer should be available in the classroom or in close proximity through a wireless printer connection for teachers and students.

Value: Teachers and students can physically see the results of their work. Teachers should monitor use to prohibit cost overruns on paper and ink.

Projector: Many presentation devices need a projector in addition to the presentation device itself for classroom display.

Value: Projectors are essential for the classroom when teachers and students utilize other technology components, such as the interactive white board.

Wireless Slates: A wireless slate allows teachers and students to interact with digital content from anywhere in the classroom.

Value: With the wireless slate, teachers are no longer tied to the front of the room by a stationary mouse or podium and can circulate throughout the classroom. This mobility allows a teacher to assume the role of coach or guide, rather than lecturer. Student participation is encouraged and students with limited mobility or who are simply uncomfortable standing in front of the class can use the wireless slate to manipulate images, words and objects on an interactive whiteboard.

Webcam: Webcams are video capture devices connected to computers or computer networks, often using a USB port or network connection via Ethernet or Wi-Fi.

Value: A webcam helps students and teachers bring creativity to the classroom and teacher, student, or class-created material into the curriculum.

Example: As part of the curriculum project in Webster Parish Schools, Louisiana, two schools were provided with webcams for classroom integration activities. Both public schools involved in the grant reflect growth in school improvement scores and students, teachers, and administrators reflect growth in technology proficiency as measured by the Louisiana Technology Proficiency Self-Assessment. http://www.webster.k12.la.us/

Classroom Components - Courseware, Content and Creativity Tools

In a knowledge economy that values creativity and innovation, software and other tools that allow students and teachers to access and use content should be paired with software and other tools that allow students to create and share content that they develop. Providing students and teachers with the ability to create and control their own content has been effective in both increasing student achievement, teacher efficacy and pride in student work.

Digital Textbooks: Content in digital textbooks is tailored to student abilities and interests.

Value: Digital textbooks offer various interactive functions and provide the learner with a combination of textbooks, reference books, workbooks, dictionaries and multimedia contents such as video clips, animations and virtual reality, both at school and at home without the constraints of time and space. Digital textbooks can save on costs over the long term.

Example: 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.

Educational Software and Subscriptions: Educational software products and subscriptions are available for purchase, download or distribution via electronic media for teachers and students. Many of these products are available for students to use at school and at home.

Value: Educational software products and subscriptions can engage students, promote self-directed learning and expand learning beyond the classroom and hours of the school day.

Example: The Language Instruction Network Knowledge (LINK) project at Mullan Trail, Ponderosa, Prairie View, and Seltice Elementary Schools in Idaho utilizes language software to provide students with access to relevant technology in the classroom and at home. The LINK project provides opportunities to engage, teach, and practice language usage skills, develop mastery with language concepts and enhance mastery of language usage and the writing process.

Geographic Information Systems: A geographic information system (GIS) integrates hardware, software and data for capturing, creating, managing, analyzing and displaying all forms of geographically referenced information. GIS can work as stand-alone desktop software, as a web-based application, or on a mobile device.

Value: GIS allows students to view, analyze, question, interpret and communicate data through the use of maps, globes, tables and charts, while using problem-solving skills to reveal relationships, patterns, and trends.

Example: In Joppatowne High School, MD, 11th grade students learned fundamental skills of geographic data analysis, expanding on each lesson by conducting local analyses to address issues in their community. During the year, they submitted maps to an annual GIS conference in the state. After passing a critical test of knowledge and submitting a capstone project, students earned a certificate recognized by NASA and the US Department of Labor. At the end of the 2008-09 year, students and teachers presented their experience before 10,000 GIS professionals from around the world.
http://www.esri.com/events/uc/agenda/plenary.html

Podcasting: A podcast is a series of digital computer files, usually either digital audio or video, that is made available for download by means of web syndication.

Value: Students can create and use their own digital content.

Example: In Upper Saddle River School District, NJ “Poetry Podcast” project, second grade students created a class podcast of their poetry reading. Using the Reading and Writing Workshop model as its backbone, the second graders read and wrote poetry for a unit lasting four to six weeks. To celebrate, each child selected one original poem to edit, revise, and publish for the Poetry Podcast. Since implementing the program in 2005, student vocabulary scores have increased by 9.3% and Reading Comprehension scores have increased by 3.2%.
http://www.setda.org/web/toolkit2008/student-engagement/technologytools#Podcasting

Productivity Tools: Tools include a typical business suite of software products that consist of word-processing, spreadsheets and any other necessary district specific applications.

Value: Teachers and students can utilize software for writing, graphing and presentations to enhance technology literacy skills.

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

Simulations: Simulations are the imitation of a real event or process and can be used to show the eventual real effects of alternative conditions and courses of action.

Value: Simulation engages students and develops critical thinking skills and strategies. Simulations eliminate science lab costs and set up time.

Examples: 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

Online Collaboration and Communication Tools

Online collaboration and communication tools enable administrators, teachers and students to collaborate and communicate online in real-time across geographic distance.

Blogs: A blog is a type of website, usually maintained by an individual with regular entries of commentary and descriptions of events or other materials. Entries are commonly displayed in reverse-chronological order.

Value: Blogs allow for an interactive, informal format for discussion and are available anytime, anywhere. Student and teacher blogs may be password protected or by invitation only to ensure student security. Blogs provide teachers the opportunity to push information to students and parents and to update their students and families in real time.

Example: In one Tennessee high school, ninth grade journalism students used a blog to publish high school news daily, whereas in the past they published a hard copy newspaper only once or twice a year due to the high cost. Now the journalism class is able to do more journalism with modern tools of the trade.
http://www.setda.org/web/toolkit2008/student-engagement/technologytools#Blogs

Chats: Online chats refers to any kind of communication over the Internet, but are primarily meant to refer to direct one-on-one chat or text-based group chat using tools such as instant messengers, Internet Relay Chat, talkers and possibly MUDs.

Value: A form of online, instantaneous communication gives students the chance to interact with classmates, teachers and/or students from other schools and grade levels from around the world. Chats can increase student collaboration and minimize errors with homework assignments or directions.

Example: Kulm High School in North Dakota has implemented handheld computers and software, allowing teachers to interact with every student in the room at the same time by creating a "chat room" like environment within the actual classroom. Teachers and students interacted via the handhelds throughout the school day. Teachers were able to push out assignments and collect assignments electronically. The administration reported that discipline was better; grades were higher; and students were retaining what was taught, according to the scores on the state assessment and online assessments that were conducted twice during the year.
http://www.setda.org/web/toolkit2008/student-engagement/technologytools#Chats.

Instructional Management Systems: Instructional management systems combine online course management, communication and collaboration tools. Online tools may include a discussion forum, file exchange, email, online journal/blog, real-time chat, interactive whiteboard, bookmarks, calendar, search tool, group work, electronic portfolio, registration integration, hosted services, quizzes/surveys, marking tools/grade book, student tracking, content sharing and an object repository, amongst other tool offerings.

Value: Instructional management systems offer collaboration and many types of communications within the school community.

Example: In Texas, Corpus Christi Independent School District improved levels of communication after implementing an instructional management system. At the instructional level, improved communication facilitated the success of team teaching and mentoring programs, allowing teachers to work together within departments and collaborate across subject areas to create exciting multidimensional lessons and share best practices. Teachers also saved time by posting all relevant information on their class webpages and directing student and parent questions there. Increased communication between teachers and parents coincided with a significant increase in the number of parents visiting the school and classroom webpages. Accelerated students moved ahead with extra assignments, readings or activities, while those who need to catch up had access to study guides and could ask questions of teachers and other students through email or online discussions. As a result, students' learning was more self-directed.
http://www.echalk.com/xres/uploads/case-studies/eChalk%20Corpus%20Christi%20ISD%20Case%20Study.pdf

Social Bookmarking: Social bookmarking is a method for Internet users to store, organize, search and manage bookmarks of webpages on the Internet with the help of metadata, typically in the form of tags.

Value: Many social bookmarking services provide web feeds for their lists of bookmarks, including lists organized by tags. This allows subscribers to become aware of new bookmarks as they are saved, shared, and tagged by other users. This saves students and/or teachers time, reduces the number of emails and compiles all resources in one central location.

Example: In the state of Washington the Department of Education's Educational Technology Office hosted a site that tagged EdTech research that supported the state educational technology plan. The planning group was able to compile research in one central location and provide public access to this research. http://delicious.com/edtech.ospi

Video-Conferencing: Video-conferencing uses specialized equipment that allows two or more locations to interact via two-way video and two-way audio transmissions synchronously.

Value: Video-conferencing builds media literacy, communication and collaboration skills. Video conferencing opens opportunities for students limited by location, saves money on travel and minimizes loss of instructional time.

Virtual Learning: Virtual learning (also referred to as online learning) may involve synchronous and/or asynchronous instruction and can supplement the bricks and mortar traditional school (face-to-face) approach to enhance learning and promote 24-7 access. Please see the above Online Collaboration and Communication Tools and the educational portals and online courseware below for additional consideration for virtual learning. Note: Virtual learning and video-conferencing are not the same thing.

Value: Virtual learning programs can provide vast opportunities for students and teachers that may not otherwise be available locally. Virtual learning supports equity and access for students, including highly qualified teachers, flexible learning opportunities, and credit recovery/remediation.

Example: ACCESS Distance Learning is a statewide, school-based program that is free to Alabama students in Grades 9-12. The initiative focuses on bringing true equity to all Alabama high school students by providing access to Advanced Placement, dual credit, and core courses, as well as electives, remedial and enrichment materials and other courses necessary to meet advanced diploma requirements. Courses are taught by certified and highly qualified teachers, aligned to state standards and delivered through online media using a web-based system.

Example: *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 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 connect their students to students around the globe. Fifth grade Reading/Lit Statewide Assessment scores at Fruitdale 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.
http://www.soesd.k12.or.us/News.asp?NewsID=278

Web Conferencing: Web conferencing tools provide the opportunity to give general presentations, online trainings and the chance for online collaboration including user desktop sharing. All meeting workspaces are organized into pods with each pod performing a specific role (i.e. chat, notes, web links, presentations etc.).

Value: Administrators and teachers can conduct online meetings that include desktop sharing of information, which can minimize travel time and expenses. Also, these events may be recorded and reviewed at a later date for participants that might want to review the materials and also for those that were not able to attend the live event.

Example: Alabama used web conferencing tools to conduct an abridged virtual version of the Alabama Educational Technology Conference. Alabama awarded over 210 teachers, administrators and other participants 1,800 hours of professional development credits for attending the 54 sessions offered through web conferencing.

Online Editing Tools

Online editing tools are digital tools that enable administrators, teachers and students to edit documents online across geographical distances.

Wikis: A wiki is a website that uses wiki software, allowing the easy creation and editing of any number of interlinked web pages. Wikis are often used to create collaborative websites, to power community websites, and for note taking.

Value: Students interact with each other and students around the world to solve problems and work collaboratively.

Example: In Perth Amboy High School, NJ, students collected and conducted tests on water samples for the “Raritan Watershed” project. They compiled data electronically and exchanged information with other schools online. Results were discussed on wikis, and multimedia presentations were 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.
http://www.setda.org/web/toolkit2008/student-engagement/technologytools#Wiki

Essential Implementation Considerations

In addition to equipping classrooms with technology tools and resources, decision makers should take into account other essential implementation and infrastructure considerations including: technology planning, IT support, digital citizenship, data systems, professional development and student assessments.

Technology Planning

Integrating technology tools requires comprehensive planning. The International Society for Technology in Education (ISTE) provides National Educational Technology Standards for students, teachers and administrators (NETS-S, NETS-T and NETS-A). Please consider the ISTE NETS-S Essential Conditions for implementing the NETS as you plan for technology integration. The ISTE Essential Conditions highlights 14 conditions including planning and leadership, professional development, technical support and policies. Please visit ISTE's NETS-S Essential Conditions for more details.

IT Support

IT support is essential for effective technology implementation. IT support often includes asset management, user administration, software installation and configuration, maintenance, warranties, technical issues, and a host of other issues related to technology.

Value: IT staff work to ensure that technology implementation is effectively meeting the needs of administrators, teachers, students and parents. IT staff can work collaboratively with administrators and teachers to build capacity at the district and school level.

Example: The MLTI program in Maine designates a Tech Lead at each school who is the primary contact and expediter for all school related support and asset management issues related to the MLTI program. Duties include, but are not limited to: supporting users with daily technical issues; technical and support liaison with vendor; ensuring that all eligible teachers, administrators and students have a working device; asset management; assignment of individual devices to users; creation and management of account access; and software installation and configuration.

Digital Citizenship

Digital citizenship is an important topic when considering student and teacher's use of technology in both personal and educational settings. 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 anytime and anywhere. 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.

Value: Access to technology 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 schools struggle to stay ahead of this ever-changing landscape. It is important to collaborate to successfully address the overarching goal of developing students who leverage all the technology, communications and information. States and districts are developing standards and policies that keep our students safe by providing them with technology skills and utilizing communication and information in the most productive ways. For more information please visit: http://www.setda.org/web/guest/toolkit2007/medialiteracy

Data Systems

Longitudinal data systems capture student demographic and achievement data over time.

Value: Longitudinal data systems are crucial for accountability and to provide comparative data across district and state lines to ensure all students are receiving relevant instruction aligned to baseline academic standards.

Example: The Pennsylvania Department of Education recently launched the Pennsylvania Value-Added Assessment System (PVAAS) Evaluating Growth, Projecting Performance. Districts and schools used progress data, in conjunction with achievement data, to ensure all students are on the track to proficiency. This comprehensive system allows all Pennsylvania educators to utilize progress and achievement data so that they are able to make data-informed instructional decisions.
http://www.pde.state.pa.us/a_and_t/site/default.asp

Professional Development

On-going sustainable professional development is an essential for creating 21st century learning environments and changing the way teachers teach and students learn. Professional development options may include:

- Education Portals
- Online Courseware
- Professional Learning Communities
- Technology Coaches/Integration Specialists

Education Portals: 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.

Value: 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.

Example: Arizona's Integrated Data to Enhance Arizona's Learning (IDEAL) is a web portal where educators access educational resources and services with the ultimate goal of increasing the academic achievement of all Arizona students and supporting school improvement efforts throughout the state. Through a single sign-on, educators enter a web environment and access a vast array of online resources including: online professional development, a streaming video library, online high stakes practice tests, iTunesU K - 12, an online school improvement planning tool and a formative assessment test item bank. 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

Online Courseware: Online courseware provides teachers access to online courses.

Value: Online courses provide professional development resources for teachers in all districts, regardless of geographic location.

Example: Delaware provides access to online courses through eLearning Delaware. Teachers have access to several clusters of courses. In one cluster, teachers learn what types of curricula and learning principles 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. Teachers connected with other teachers in an online environment to ensure on-going and sustainable professional development.
http://www.dcet.k12.de.us/elearning/index.shtml

Professional Learning Communities: Professional, online learning communities provide teachers and administrators the opportunity to share resources, highlight strengths and gain support in an online setting.

Value: Online learning communities provide the opportunity for collaboration in a collegial environment and for teachers to learn and share without time or travel constraints.

Example: Iowa's Professional Development Model incorporates video conferencing, peer coaching and follow-up assessments and promotes individualized instruction. Teachers and coaches are able to watch others teach using video conferencing despite long distances. These professional learning communities provide teachers with the collegial support needed to increase the likelihood that teachers will adopt the new strategies into their behavior. The training and support has revolutionized the way that teachers in these districts instruct math and reading, and the data serves as proof of the program's effectiveness.
http://www.perl.educ.iastate.edu/reports

Technology Coaches/Integration Specialists: In a professional development context, coaches and mentors provide teachers with leadership for lesson planning and implementation, honing specific teaching strategies, developing and identifying instructional materials and resources and modeling professional discussions about student learning.

Value: Experimental studies have proven that mentoring and coaching relationships benefit from the use of technology in many ways. As a result of delivering these services using technology, the coaching and mentoring process is compressed through near-real-time service. This is particularly critical in rural and inner-city areas where these opportunities are often limited. Instructional technology coaches or mentors in schools provide opportunities for collaboration in planning and co-teaching to help teachers utilize new practices and resources

Example: Virginia dedicated state funding to provide one coach for every 1,000 students for all schools. The role of the coaches is to work directly with teachers to integrate technology in the classroom, to train teachers to use technology effectively and to assist with curriculum development as it relates to educational technology. Virginia's coaches use management systems to provide online and hybrid professional development sessions to schools. Web 2.0 tools such as blogs and wikis help foster participation and collaboration and the development of 21st century skills.
http://www.doe.virginia.gov/VDOE/Technology/OET/itrt_guidelines.pdf

Student Assessments

Assessments are used to evaluate student growth and achievement. Common assessments that utilize technology include: formative, online, performance and portfolio.

Formative Assessments: Through the use of technology, classroom teachers can conduct innovative micro-assessments of all students for the purpose of improving instruction.

Value: This provides exciting new opportunities for the remediation or enrichment of each and every student helping all students reach their highest potential. This will not happen without adequate teacher training, IT support to ensure the reports delivered to teachers are relevant and user-friendly and strong leadership. Data analysis is essential in driving classroom instruction at the school, district, and state levels of the educational system.

Example: In Seminole County, FL the district purchased handheld devices to conduct the DIBELS reading assessments in 2004. Scores were delivered in real-time, and after a button was pushed to sync the device, data was transferred to a secure web platform that provided tools for analysis and data-driven instructional decision making. In addition, teachers, principals and administrators can accessed a range of easy-to-read reports designed to deliver the data views educators needed to track progress and understand what resources and strategies were most effectively improving student outcomes. For the last five years, this focused system of data collection, analysis and intervention had led the entire Seminole County school district with 36 elementary schools to an "A" ranking according to the Florida Department of Education.
http://thejournal.com/articles/2008/07/01/elementary-schools--the-time-is-now.aspx?sc_lang=en

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. Online assessments are used for low stakes testing to provide feedback to the student or teacher. Data in summative context can be used for student grade promotion and, in some cases, for facilitation of state standardized achievement tests.

Value: Real-time, automated scoring and aggregation of results that can be analyzed in a timely fashion.

Example: Virginia's web-based Standards of Learning (SOL) Technology 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. 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.
http://www.doe.virginia.gov/VDOE/Technology/soltech/soltech.html

Performance Assessments: Performance assessments sometimes called authentic or project-based assessments requires student demonstration of a skill set either through series of actions or development of a product in order to prove competency. This type of assessment presumes that product completion can only be accomplished by the student knowing and understanding the series of embedded skills being assessed.

Value: Technology can facilitate performance assessment by creating simulations of projects or activities that require, in accurate fashion, the same behavioral procedure and choices as the real-life situation.

Example: Students at McKinley Technology High School in Washington, DC, specialize in one of three technology-focused areas: biotechnology, broadcast technology and information technology. Broadcast teachers work with language arts teachers to create performance assessments that require students to showcase both their broadcast and language arts skills.

Portfolio Assessments: Portfolio assessment allows for evaluation of student achievement through a repository of student-created artifacts that are gathered over an extended period of time, whereby the student has made decisions about selecting and organizing the work and has reflected upon the individual products within the portfolio as well as the package of material as a whole. Typically, the pieces included in a portfolio represent finished products rather than in-process documents.

Value: Because portfolios contain multiple products taken from different points in time, they allow for the demonstration of student growth over that period of time (e.g., a school year). Technology is integral to the effectiveness of portfolio assessment as it allows for the creation and sharing of a portfolio from within and out of a school.

Example: South Carolina's STEPPS (Sustained Technology Education for Professionals, Parents, and Students) grant project for 6th - 8th graders focus on one language arts teacher in each grade at Johnakin Middle School. STEPPS provides intensive professional development, equipment and parent outreach to improve student attendance, behavior and academic achievement through the use of technology. Teachers receive training in technology integration, media literacy, software and participation in online professional development. Technology-rich classrooms were established along with the development of technology-rich lessons. Improved home-school communication was also made possible through the use of technology. Using the state's ePortfolio System, students submit electronic portfolios to document progress in academics and technology proficiency. Average MAP Scores for grant students improved from 210.6 to 216.7. Overall, 68% of students made gains in ELA scores on Measure of Academic Performance. There was a 29.5% decrease in total office referrals for discipline between 2006-07 and 2007-08 as of 4/8/08. Truancy rates decreased 37% in the same period of time. http://www.marion1.k12.sc.us/education/district/district.php?sectionid=

For Additional Details and Examples Please visit: The Leveraging Title I & Title IID Partnerships: Maximizing the Impact of Technology in Education Guide
Please join the Online Discussion and Share Your Examples.
http://www.setda.org/web/guest/titleIwiki