FACILITIES FOR 21ST CENTURY LEARNING

Implications for 21st Century Learning

Technology

Technology has been used extensively to help students learn basic and critical thinking skills. In the future, the applications and capabilities of educational and information management technology will increase students’ capability to demonstrate learning in multiple ways for multiple audiences. Today, the majority of jobs require more technological proficiency and that students leave school with the ability to work with and use technology in a collaborative work future.

Technology empowers learners to share self-generated knowledge and make real world connections that reach beyond school walls. Technology provides educators opportunities to utilize innovative and engaging teaching practices, expanded learning communities, and current information. Appropriate integration of technology increases student achievement, supports responsive and inclusive instruction and provides collaborative learning experiences that promote college and career readiness in a global society.

With the appropriate integration of technology, students will have access to a broad range and depth of content and resources that are relevant and engaging. A digital environment provides an organizational structure for efficient and asynchronous access to current information from multiple locations. This flexibility will help to meet the needs of each learner, foster ownership in the learning process and increase critical thinking skills. The tools of technology enable teachers to design and facilitate instruction that is engaging, responsive, inclusive, and collaborative. As a result, students are involved in real world connections beyond the walls of the classroom and have access to instruction tailored to their individual learning style. The tools of technology evaluate progress by collecting, analyzing and organizing student information. The immediate feedback can be used by students to promote ownership of learning and provide multiple opportunities for growth. Educators can use the information compiled and analyzed by technology to inform instructional decisions (differentiated instruction, flexible grouping, readiness, enrichment, etc.) that result in increased student achievement. Technology platforms can be used by students to create products for summative assessments and document growth.

Technology Integration research and student achievement:

- Technology applications that enable student collaboration tend to result in improved achievement. They provide realistic, complex environments by furnishing investigative tools and data resources, and linking classrooms for joint investigations (Means & Olson, 1997).
- Sophisticated interactive software creates opportunities for students to learn by doing, receive feedback, continually refine their understanding, and build and represent new knowledge (Barron et al., 1998).
- Integration of technology with curriculum increases student achievement. Significant student achievement gains for technology integrated with standards were demonstrated by an eight-year longitudinal study of SAT-I performance at New Hampshire’s Brewster Academy (Bain & Ross, 2000).
- Educational researchers and practitioners agree that the potential of new technologies for learning is found not in the technologies themselves, but in the way these technologies are used as tools for learning (Owsten, 1997; Valdez & McNabb, 1999).
- Much of the software available can be used to improve thinking skills. Visualization tools enable users to discern patterns and detect relationships (Brodie et al., 1992; Kaufmann & Smarr, 1993).
- Technology does affect academic achievement, but is dependent on how the technology is used. Grade-appropriate use of computers is more important in producing increased learning than the amount of time computers are used. Asking students to apply higher order concepts is associated
with significant learning gains (Wenglinsky, 1998).

- Using peripheral devices allows you to create new opportunities for developing effective curriculum and instruction (Bransford, Brown, & Cocking, 1999).
- Technology provides a widespread audience for students' work. Computers link students to the world, provide new reasons to write, and offer new sources of feedback on ideas (Peck & Dorricott, 1994).
- When students use the Internet to research topics, share information, and complete a final project within the context of a semi-structured lesson they become independent, critical thinkers (Coley, Cradler, & Engel, 1997).
- Students gain a greater sense of responsibility for their work through the use of technology. They produce higher-quality assignments that reflect the increased depth and breadth of their knowledge (Glennan & Melmed, 1996).
- Students today are accustomed to working within networked environments. To a student in the 21st century a networked environment may include their home computer, cell phone, handheld, and personally designed Web sites (Tapscott, 1998).
- Networked technology can enable teachers and students to build local and global communities that connect them with interested people and expand opportunities for teacher learning (Kozma, 2003).

In order for appropriate instructional technology integration to occur in DoDEA 21st Century schools, specific technology components must be fully operational such as voice, video, and data cabling throughout the facilities. The implementation of voice, video, and data cabling throughout school facilities is becoming standard in schools across the country. Appropriate, strategically designed technology greatly enhances the teaching and learning of basic skills and positions the school to take advantage of technological developments in the future.

In addition, to take advantage of technology, schools need comprehensive professional development programs and training; student access to technology applications; updated hardware and software in computer labs, learning studios, and information centers; wireless access points; updated school wiring and Internet access; integration of technology into the academic content standards; home to school access; technical support personnel at the school level; and a security system that protects and encourages use of equipment.

All instructional areas should be multi-use/multi-purpose with invisible technological support. There should be a seamless web of technology to support the classroom information management between administration, teachers, students, and the home.

Technology integration is a large component of the newly adopted Common Core State Standards. Research suggests that multi-sensory teaching improves student mastery of basic skills. Technology supports visual, auditory, and experiential learning; therefore, it is recommended that all instructional spaces have voice, video, and data accessibility. This access also enhances the flexibility of the learning environment to respond to alterations in the use of space. The wiring and other infrastructure components should be the first priority. Terminal devices can be added later; however, wireless networks should also be included. The facility should have surplus electrical power capacity and network wiring/bandwidth to permit expansion of technology.

It is important that all students demonstrate technology skills appropriate to their grade level. Students are expected to acquire technology skills through authentic learning opportunities and using applicable technology.

**Technology Components**

**Voice:** Telephone and voice communications in every instructional area and workspace to support internal and external communications.

**Video:** Video distribution in every learning studio and throughout the building with interactive video capabilities to support whole-group and small-group instruction and distance learning, providing access to a wide range of internal and external resources.

**Data:** Data retrieval capabilities in every instructional area and throughout the building as well as Internet network capabilities to other external resources.

Today's schools are equipped to support management and instructional applications. Current digital voice, data and video systems can provide instruction, data management, Internet, and student services that go...
far beyond the systems in schools that were construct-ed as recently as the late 1990s. Technology is becoming increasingly useful and appropriate for the student and the educator to incorporate into everyday instruction and application. As home and business worlds move toward higher levels of technological applications, it is critical for schools to be adequately equipped and adopt a leadership role in the integration of technology into the teaching, learning, and communication processes.

Applications of Technology
Technology has four primary applications within the school environment. These applications have the potential to have a positive impact on every aspect of the educational process. The four primary applications include:

1. Communication/productivity: e-mail, word processing, database, spreadsheets, telephone, homework, web pages, presentation creation
2. Student services: schedules, grades, attendance, counseling, transportation, food services, advanced learning management services
3. Educational technology: media centers, computer applications, A/V applications, online learning
4. Business systems: accounting, payroll, inventory

Technology and the Learning Environment
Technology greatly enhances the learning environment. Technology, in the typical studio, can support multiple instructional designs:

1. Whole group instruction (20-30 students). This includes the use of document readers, computer projectors, media players, flat screen monitors, interactive whiteboards, LCD flat panels and touch screens and other forms of computer display techniques.
2. Small group instruction (six to eight students). This includes areas within the studio and shared common spaces, in which a teacher or another resource person can work with groups of students. The technology is essentially the same as whole group instruction technology, the only difference being the size of the groups.
3. Individualized instruction (one to two students). This is primarily computer-based instruction with online courses in which students interact with a computer workstation. It is envisioned that these computers are laptops that integrate voice, video, and data formats and have high speed Internet access. This type of instruction promotes customized learning for students at all levels. Customized learning allows the teacher to track student progress daily and assign appropriate interventions via online learning management systems.

The adjacent diagram represents typical technology

applications found in schools today.

Learning Studio
It is recommended that all learning studios have voice, data, wireless internet, and video accessibility. This should enhance the flexibility of the learning environment to respond to alterations in the use of space. The following components should be included in each learning studio:

- Teacher workstation or laptop with data drops
- Student laptops, tablet computers, or mobile devices
- Data outlets for student laptops or work stations
- Wireless access
- Audio enhancements with volume control
- Support for document readers
- Interactive white board with integrated projector
Careful attention should be given to furnishings, i.e., mobile student desks, specialized or customized cabinetry, location of data ports, white boards, and monitors. It is suggested that student furniture be tables and chairs and not individual desks.

**Multipurpose / Commons**
Technology in the Multipurpose / Commons serves multiple purposes. Key pads or scanning devices should be used to allow students to enter identification confidentially. Technology can also be used to provide audio enhancement and also allow for visual presentation on one or multiple walls within the Multipurpose or Commons areas.

**Wireless Access Points (WAPs)**
Wireless access points that allow access to wireless technology without interruption should be located within facilities. Consideration should be given to high traffic volume areas such as Neighborhoods, Information Centers, and Multipurpose / Commons areas. It is intended that access to technology is seamless and pervasive throughout the building.

**Studio Audio Enhancements**
Audio enhancement improves sound quality in the learning environment. This device must be mobile and adaptable for different instructors, be easy to use (seamless), and must be durable as it is used on a daily basis. Provide appropriate speakers and consider the proper location when providing this tool.

**Flat Screen Monitors**
Flat screen monitors in the facility should be sized and mounted appropriately for the space that they are located. The quality of picture, life expectancy of the monitor, glare, touchscreen capabilities and access to power should be considered as well.

**Interactive White Board**
Interactive white board technology should be provided in **all learning communities** and strategically placed in the facility (including the Information Center and physical education spaces). The latest interactive white board technology uses wireless technology and many have alternative power sources, thus providing flexibility of location.

**Document Reader**
Document readers should be provided within the learning community and other learning spaces as appropriate for the current curriculum. These devices generally are mobile and can be easily stored in lockable cabinets.