# Washington State Educational Technology Plan:

## A Blueprint for Washington's K-12 Common Schools and Learning Communities







***Dr. Terry Bergeson***
State Superintendent of
Public Instruction


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# Washington State Educational Technology Plan

## A Blueprint for Washington's K-12 Common Schools and Learning Communities

Prepared by
Dennis Small, Educational Technology Program Manager

**Education Technology and K-20**
**Office of Superintendent of Public Instruction**

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Dr. Terry Bergeson
Superintendent of Public Instruction

Marty Daybell
Chief Information Officer/Deputy Superintendent,
Administration & Operations

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Office of Superintendent of Public Instruction
Old Capitol Building
P.O. Box 47200
Olympia, WA 98504-7200

For more information about the contents
of this document, please contact:
Dennis Small, OSPI
E-mail: dsmall@ospi.wednet.edu
Phone: 360.725.6384

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# *Executive Summary*

In 1994, Washington State issued its first educational technology plan. Since then tremendous changes have occurred in how educational technology—*"the combination of human imagination, inventiveness and electronic tools that transform ideas into reality to meet a need or solve a problem"*—is applied to Washington's learning and teaching needs.

In September 2002, the Superintendent of Public Instruction, Dr. Terry Bergeson, assisted by the Educational Technology Advisory Committee (ETAC), updated the educational technology plan and the vision for the use of educational technology in Washington schools.

Beginning in late 2004, the Office of Superintendent of Public Instruction (OSPI) again began to work with the ETAC to review and update the plan to address new federal requirements created by the No Child Left Behind (NCLB) legislation. The ETAC and its working groups completed their work in December, 2005, which is reflected in this update to the 2002 Washington State Educational Technology Plan: A Blueprint for Washington's K-12 Common Schools and Learning Communities.

Both the 1994 and 2002 plans contained twelve comprehensive recommendations, addressing a wide variety of educational technology issues. The 2005 ETAC recommended that this year's plan focus on only **one** new key initiative:
**Establish a holistic technology professional development grant program supported by state or federal funding that ensures that technology essential conditions are in place and provides funding for intensive peer coaching/mentoring support for a minimum of three years (see pages 53-54).**

Additional new elements in this updated plan include:

- Washington State's definitions of technology literacy and fluency (pages 18-20), and Indicators of Technology Literacy Tiers (see Appendix F or http://www.k12.wa.us/EdTech/TechLitTiers.aspx);
- Washington State's definitions of technology integration into the curriculum (pages 20-22), and Indicators of Technology Integration Tiers (see Appendix G or http://www.k12.wa.us/EdTech/TechIntTiers.aspx);
- A definition of Technology Essential Conditions which are necessary to support technology integration and literacy (page 22 or http://www.k12.wa.us/EdTech/TechEssCondDef.aspx);
- The relationship between educational technology and Washington's newly-developed Grade Level Expectations (GLEs) (see Appendix C or http://www.k12.wa.us/EdTech/EALR-GLE-Tech.aspx); and

- Ten key strategies identified by the ETAC to support technology integration and literacy (pages 54-56):
  1. *Highlight professional development initiatives that are already underway through the state-funded Educational Technology Support Center (ETSC) Program.*
  2. *Highlight existing connections to statewide curricular initiatives and make new connections.*
  3. *Strengthen existing connections to Professional Growth Plans for educators.*
  4. *Strengthen existing connections to Pre-Service Training of new teachers.*
  5. *Identify and highlight districts that have required technology competencies for educators or use technology integration as an element of teacher observations by administrators.*
  6. *Identify and highlight districts that have required technology literacy courses for students or have aligned their curriculum to NETS Standards.*
  7. *Identify and highlight districts that include technological resources as part of their curriculum adoption cycle.*
  8. *Require districts to address Technology Essential Conditions as part of the 2007-2010 school district technology planning process.*
  9. *Make connections to the Microsoft Partners in Learning "Learning Transformed" Grant awarded to EWU and Cheney School District.*
  10. *Strengthen existing connections to National Board Certification for educators.*

Beginning with the 2006-07 school year, districts will be required to report to OSPI the technology literacy of their 8th grade students and the integration of technology by teachers. Resources to assist districts are under development by OSPI and will be posted online at http://www.k12.wa.us/EdTech/TechRequirements.aspx.

A strong planning process is not a one-time event. Looking to the future, the Educational Technology Advisory Committee will continue developing and evaluating these and related recommendations. The advisory committee will also measure success over time and report to schools, the Legislature, the Superintendent of Public Instruction, and other stakeholders on the continuing technological achievements and challenges in Washington's educational system.

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## *LIST OF APPENDICES*

# *1.0 Introduction*

This section discusses the purpose, background, and organization of the educational technology plan.

## *1.1 PURPOSE*

The purpose of this update to the 2002 educational technology plan is to:

- Meet state and federal educational technology planning requirements.
- Provide a current snapshot on current educational technology progress.
- Identify best practices, resources, and current issues in educational technology.
- Provide guidance to key stakeholders on educational technology implementation.

## *1.2 BACKGROUND*

The Superintendent of Public Instruction must develop and periodically update a statewide educational technology plan with the assistance of an Educational Technology Advisory Committee (ETAC). The planning process evaluates:

- School and school district planning, implementation, and staff training in the use of technology in curriculum, instruction, assessment, and administration.
- The status of electronically connecting school districts, institutions of higher learning, and other sources of online information.
- Equitable methods to increase educational technology use by students and school staff statewide.
- Funding recommendations and requirements for educational technology.

The Superintendent of Public Instruction published the first educational technology plan in 1994, with addenda in 1996 and 2000, and minor draft revisions in 1998. A major reworking of the plan occurred in 2002.

Today the educational technology opportunities and challenges are even greater than they were when Washington's education reform movement was conceived in 1993. Schools have access to a broader and richer variety of educational technology hardware, software, and media resources. However, teachers and students face new teaching and learning standards that demand increasingly effective and appropriate use of educational technology. Providing more hardware is necessary but insufficient. Teachers and their students need the human element as well to make educational technology work effectively—professional development and adequate resources must accompany technology infusion in the classroom.

## Educational Technology Planning Process

Several requirements and initiatives drive the need for a state educational technology plan. First, state education reform legislation requires periodically updating the state educational technology plan. In accordance with RCW 28A.650.015, the Superintendent of Public Instruction must "develop and implement a Washington State K-12 education technology plan" that must be updated "on at least a biennial basis" and should be developed "to coordinate and expand the use of education technology in the common schools of the state."

Second, recently enacted legislation under the federal Elementary and Secondary Education Act (ESEA or "No Child Left Behind Act") requires state technology planning in order to receive federal funding under the act. The federal legislation requires Washington to undertake state and district-level technology planning, articulate "technology literacy" for students, and focus educational technology efforts on children in poverty and at-risk of academic failure.

Finally, rapid increases in educational technology development, dissemination, and practice requires a new statewide perspective on how technology is furthering educational goals under Washington's education reform efforts and what issues need to be addressed.

The Superintendent of Public Instruction is required by RCW 28A.650.105 to appoint an Educational Technology Advisory Committee (ETAC) to "assist in the development and implementation of the technology plan" with representatives from a wide range of educational stakeholders. The ETAC met a number of times during 2005, and also established Working Groups to assist in developing recommendations on:

- Student Technology Literacy.
- Technology Integration into the Classroom.
- Technology Essential Conditions.

This report is the result of the sustained dedication of the advisory committee members and its supporting Working Groups. ETAC volunteers have come together on multiple occasions—frequently using videoconferencing technology, electronic mail, and the Internet—to discuss and define how educational technology can and should be used appropriately to improve achievement and lifelong outcomes for students in Washington's public schools. This report is the product of their work.

Appendix A provides additional information on the ETAC membership and the Working Group participants.[1]

## *1.3 ORGANIZATION OF THIS REPORT*

This report will be provided in two alternative formats: a paper report and a companion website.

Paper Report

This paper report describes the findings and conclusions of the Educational Technology Advisory Committee. Specifically, the report describes:

- *Legislative charge*—state and federal requirements that drive the educational technology planning process.
- *Vision*—the Educational Technology Advisory Committee's vision for educational technology.
- *Key Concepts*—the conceptual framework for educational technology in Washington's schools; namely, how educational technology contributes to high performing schools and the interdependent nature of multiple stakeholders in educational technology.
- *State of the State*—district, regional, statewide educational technology initiatives, funding, and policy issues.
- *Gap Analysis*—what the research says and how Washington State compares.
- *Recommendations*—for policy makers, schools, communities, and others.
- *Appendices*—the educational technology planning process, bibliography, relationship of educational technology to education reform standards, 1994 and 2002 technology plan recommendations, current educational technology initiatives, indicators of technology literacy tiers, and indicators of technology integration tiers.

Several conventions are used in the educational technology plan. Most information sources may be found online. Rather than citing Internet addresses repeatedly throughout the document or citing multiple Internet addresses on one page, the endnotes provide an Internet source or a reference source. Additional information is provided in a companion bibliography (Appendix B). The bibliography allows the reader to obtain additional reference information, including Internet address, sponsoring organization, and a brief abstract, and review selected programs and organizations. In limited cases, Internet addresses are provided in the text of the report when an example or information resource may be particularly useful to pursue directly online.

## Companion Website

In addition to publishing the paper report, OSPI will also provide a web-based version of the educational technology plan. Besides providing the contents of the paper report of the Educational Technology Advisory Committee, the companion website will provide:

- Links to additional resources.
- Rubrics and assessment tools for the Tiers of Technology Literacy and the Tiers of Technology Integration, along with suggestions on how districts can customize the examples in the tiers to align with district initiatives.
- A rubric of Technology Essential Conditions.
- Links to tools to help guide education leaders, teachers, and administrators through their technology planning process.

# *2.0 Legislative Charge*

This section describes state and federal legislative requirements and associated educational technology resources, including education reform legislation and the federal Elementary and Secondary Education Act (ESEA).

## *2.1 STATE LEGISLATIVE CHARGE*

Educational technology requirements are infused throughout Washington's education reform effort.

Education Reform Legislation [2]

In 1990, with the establishment of the Governor's Council for Education Reform and Funding (GCERF), education reform became a focus for all stakeholders in Washington State. As the Council's subgroups focused on specific topics ranging from learning outcomes to governance, there was an emerging recognition of the critical role technology must play in shaping the system. At the request of the Council, Judith A. Billings, then State Superintendent of Public Instruction, convened an Ad Hoc Technology Task Force to provide the Council with recommendations regarding the role technology should play in education reform.

The Council incorporated many of the ad hoc task force's recommendations into their report to the legislature. The GCERF recommendations to the legislature included initial recommendations for $50 million during the 1993-95 biennium to build technology infrastructure and support local district efforts in technology.

During the 1993 legislative process, the GCERF report evolved into Engrossed Substitute House Bill (ESHB) 1209, which was enacted by the Washington State Legislature. Washington's 1993 Education Reform Act required the development of academic content standards for all students in eight core content areas which included: reading, writing, communications, mathematics, science, social studies, the arts, and health and fitness. The Commission on Student Learning developed the process for developing these content standards and the system for assessing student progress towards meeting these requirements. The 1993 law required the establishment of timelines for the development of the academic content standards (Essential Academic Learning Requirements—EALRs) and an aligned assessment system. As required by this legislation, the full implementation of the statewide standards and assessment system was effective in 2000.

As required by the state's education reform legislation, the Commission created eight subject advisory committees to develop the EALRs in the eight core content areas. Each group was composed of public and private school educators, parents, community members, business people, and high school students. More than 400 people participated in the development of these academic content standards.

After their initial development, the EALRs were presented in a number of public forums for review, discussion and revision. The outcome of these thoughtful public debates and research reviews was the 1995 formal adoption of the reading, writing, communication, and mathematics EALRs. By 1998 the remaining four content area Essential Academic Learning Requirements were adopted. During the last seven years, minor edits have been made in all of the academic content standards. Like the initial development phase, these have occurred through a process where a representative group reviewed and implemented changes. These changes were then reviewed by the greater public and put into place.

Since 1995, Washington has had in place academic content standards (EALRs) in reading, writing, communications, and mathematics. The standards were developed for all children at three grade spans (elementary, middle/junior high, and high school). Specific benchmark and component level requirements on what children should know and be able to do are defined in each subject area. The standards are rigorous and require higher level thinking on the part of all students. The Washington Assessment of Student Learning is administered annually to students in grades four, seven, and ten to assess student achievement in relation to these benchmarks. In the past few years, Grade Level Expectations (GLEs) for implementing these EALRs have also been developed.

The Washington State Legislature, through the 1993 Education Reform Act (ESHB 1209), also directed the Superintendent of Public Instruction to develop a state technology plan for K-12 schools with the assistance of a statewide Educational Technology Advisory Committee (ETAC).[3] Past efforts have included integrating technology into the EALRs and identifying statewide technology development requirements in support of education reform efforts. The link between the EALRs, GLEs and educational technology are shown in Appendix C.

The 1994 state educational technology plan described a number of initiatives underway at that time in support of education reform efforts, including:

- Technology support to school districts through the Educational Technology Support Centers in each of the nine educational service districts (ESDs).
- Enhancement of the statewide data network.
- Networking consultants for districts.
- Interactive videoconferencing services.
- Online curriculum projects.
- Fiscal allocations to schools for educational technology investments.

The 1994 state plan provided 12 recommendations pertaining to educational technology policies, resources, and implementation. These 12 recommendations (see Appendix D) addressed leadership, resource, and implementation issues. The 12 recommendations from the 2002 state plan (also in Appendix D) addressed standards and professional development, fiscal policy and strategic funding, and learning and teaching support. Section 6 provides a progress review and examines the status both the 1994 and 2002 recommendations.

## *2.2 Elementary and Secondary Education Act (ESEA)*

H.R. 1, the "No Child Left Behind (NCLB) Act," passed by Congress in late 2001 and also known as the re-authorized Elementary and Secondary Education Act (ESEA),[4] has significant policy and fiscal implications for educational technology planning. The major focus of the ESEA is to provide all children with a fair, equal, and significant opportunity to obtain a high quality education. The act is based on four conceptual "pillars:"

1. Accountability
2. Flexibility
3. Research-based Education
4. Parent Options

The following section provides a brief overview of the section of the federal legislation that provides direct funding for educational technology.[5] Additional funding information is provided in Section 5.2, Funding.

Title II, Part D: Enhanced Education Through Technology

Title II, Part D—preparing, training, and recruiting high-quality teachers and principals—provides funding for Enhancing Education Through Technology (EETT).[6] Technology funding is provided through a state formula, as well as through competitive grants. Funds may be used for promoting state and local technology initiatives to increase student achievement, increasing access to technology, and improving and expanding teacher professional development in technology.

Fifty percent of the available local education agency (LEA) technology funds are distributed to eligible applicants on a formula basis, and a minimum of 25 percent of these funds must be spent on professional development. The remaining 50 percent are used for a competitive grants program. During the 2005-2006 school year, these funds are supporting schools' participation in the "NO LIMIT" Project (New Outcomes and Learning Improvement in Mathematics, Integrating Technology). The project goal is to improve proficiency for middle school mathematics students in high poverty, high need schools.

The NO LIMIT project develops classroom models where middle school students are using technology-infused, project-based learning to improve their achievement in mathematics. Performance indicators of successful implementation have been developed and are being evaluated by the Woodring Applied Research and Development Center at Western Washington University (WWU).

Washington's goal for the allocation portion of the grant is for more teachers to be trained in the integration of technology into the curriculum, increase their use of research-based project models, and increase student technology literacy. However, with an average allocation of about $3 per student, OSPI's expectations are modest.

# *3.0 A Vision for Educational Technology*

Although meeting state and federal educational technology planning requirements is essential, the 2002 ETAC adopted a broader vision for Washington's continuing educational technology development, which the 2005 ETAC also endorsed. This section describes the advisory committee's vision statements and the singularly important definition of "educational technology."

## *3.1 VISION AND BELIEF STATEMENTS*

Expanded Version

*In a society increasingly dependent on information and knowledge, equitable and universal access to technology, media and information resources is essential to the learning process. With access to and proficiency in the use of these tools, and with the guidance of skilled educators and community members, all students have the opportunity to become actively engaged and take responsible roles in their learning as they think, create, conduct inquiries, solve problems and communicate in individual, collaborative and interdisciplinary settings.*

*As a result, students emerge as lifelong learners, productive members of the workforce, and citizens that can effectively contribute to our democratic way of life.*

Short Version

*Education today requires the knowledge and skills to utilize technology, and equitable and universal access to it.*

## *3.2 EDUCATIONAL TECHNOLOGY DEFINED*

*While* technology*, in its broadest sense, can be defined as "the practical application of knowledge" (from Webster's online dictionary), in this document we define* educational technology *to be "the combination of human imagination, inventiveness and electronic tools that transform ideas into reality to meet a need or solve a problem."*

Educational technology includes hardware (computers, handheld devices, printers, digital cameras), software and content applications (programming classes, productivity software), and media (the Internet and videoconferencing).

Educational technology may be applied in several ways:

- For learning and academic achievement in the classroom—curriculum and instruction.
- For sharing information and best practices—professional development through regional, statewide, and federal initiatives and funding sources.
- For monitoring and diagnosing student achievement and professional development—assessment and reporting of results, interactive (online) information resources on school characteristics, and analytic tools.
- To facilitate school administration and organizational effectiveness—grade checkers, productivity software, attendance monitoring, compiling information, and communicating with students, peers, administrators, parents, and others.

Stated simply, educational technology is not computers, software, and the Internet. Educational technology is, ultimately, "*the combination of human imagination, inventiveness and electronic tools that transform ideas into reality to meet a need or solve a problem."*

# *4.0 Key Concepts for Educational Technology*

This section discusses the conceptual relationship between educational technology and high performing schools, OSPI's strategic planning goals, the interdependent nature of key stakeholders involved in educational technology, and related key concepts that have guided the ETAC throughout the educational technology planning process. Overall, this section of the educational technology plan emphasizes:

- Relating educational technology goals to the characteristics of high performing schools and to OSPI's strategic planning objectives.
- Underscoring the interdependent nature of stakeholders involved in educational technology planning, including policy makers, school educational leaders, educators, other staff, and the local teaching and learning communities.
- Endorsing learning and teaching philosophies that support the appropriate and effective integration of educational technology into curriculum, instruction, and assessment practices.
- Defining technology literacy and fluency, technology integration, and technology essential conditions.

## *4.1 EDUCATIONAL TECHNOLOGY AND HIGH PERFORMING SCHOOLS*

The 2002 ETAC reviewed several conceptual frameworks and examined their applicability to Washington State's technology planning process. Such frameworks help policy makers and educators evaluate educational technology in general and the progress of schools and district educational technology efforts in particular. The advisory committee reviewed several frameworks for their potential applicability to Washington's efforts. Key frameworks included:[7]

- The Milken Foundation's "7 Dimensions for Gauging Progress" (Lemke and Coughlin, 1998).
- The North Central Regional Educational Laboratory's enGauge framework that outlines "Six Essential Conditions for the Effective Use of Technology in Learning."[8]
- OSPI's "Nine Characteristics of High Performing Schools."
- The CEO Forum's interactive "School Technology and Readiness (StaR) Chart."[9]

For instance, the Milken Foundation's "7 Dimensions for Gauging Progress" considers the role of educational technology in terms of:

1) Learners;
2) Learning Environments;
3) Professional Capacity;

4) System Capacity;
5) Community Connections;
6) Technology Capacity; and
*7)* Accountability.

A conceptually strong framework should be based on empirical research that clearly identifies critical factors related to the successful application of educational technology. It should allow policy makers, educators, and other stakeholders to examine the key dimensions of educational technology, for instance, "Professional Capacity," and then provide specific measures to assess Washington State's particular strengths or limitations in this area.

The advisory committee focused on OSPI's "Nine Characteristics of High Performing Schools" due to its unique application to Washington's education reform efforts, the complementary relationship of educational technology and the nine characteristics, and the advisory committee's explicit goal to link educational technology to student achievement, i.e., high performing schools within the context of Washington's education reform efforts. High performing schools have:

1. *A clear and shared vision and purpose.*
2. *High standards and expectations for all their students.*
3. *Effective leadership in both instructional and administrative areas.*
4. *High levels of teamwork.*
5. *Aligned their curriculum and instruction with the state standards and assessments.*
6. *Closely monitored teaching and student progress.*
7. *Emphasized professional development.*
8. *A supporting learning environment.*
9. *A high level of community involvement.*[10]

The "Nine Characteristics of High Performing Schools" is based on OSPI's evaluation of 20 recent research studies that examined the common characteristics of high performing schools. Several studies were reviews of other research that has taken place over many years on the same topic, while others examined these schools in specific settings and locations, such as high performing elementary schools in a large urban setting. This body of research represents findings from both Washington State and around the nation.

OSPI staff analyzed the studies to determine what characteristics were found most often among high performing schools. Performance was usually measured in terms of high or dramatically improving scores on standardized tests, often in difficult circumstances such as high levels of poverty. In every case, there was no single factor

that accounted for the success or improvement. Instead, the research found that high performing schools tend to have a combination of common characteristics. Some reports found as few as five characteristics, while others found many more. OSPI's analysis of these characteristics narrowed these lists into nine areas.

By focusing educational technology on the dimensions of high performing schools, the ETAC addresses a recurring issue that has faced educational technology throughout Washington's education reform efforts, namely, *"How does educational technology contribute to a successful school, and under what conditions?"*

## *4.2 EDUCATIONAL TECHNOLOGY AND OSPI STRATEGIC GOALS*

Another key concept is the linkage of the educational technology planning process with OSPI's strategic goals. OSPI, through its strategic planning process, has developed several overarching goals that provide a state-level perspective on Washington's educational strategy. The four goals are:

1. *All students demonstrate high levels of achievement in the four state learning goals,*[11] *and successfully graduate from high school.*
2. *All students in Washington have high quality educators, staff and educational leaders supporting their success.*
3. *All students learn in a safe, civil, healthy, and engaging environment.*
4. *All Office of Superintendent of Public Instruction (OSPI) staff use integrated, sound management and operational practices to ensure excellence in internal and external customer services.*

The educational technology planning process takes these goals into consideration. In summary, Table 4.1 shows the relationship between OSPI's strategic planning goals, the nine characteristics of high performing schools, and educational technology.

*Table 4.1. Educational Technology's Contribution to Nine Characteristics of High Performing Schools and OSPI Strategic Goals*

| Strategic Goal | Characteristics of High Performing Schools | Educational Technology Contribution |
|---|---|---|
| *Goal 1—All students demonstrate high levels of achievement in the four state learning goals and successfully graduate from high school.* | Clear and Shared Focus | • Provide effective media to communicate expectations to students and to promote student "buy-in" to clear and shared focus |
| | High standards and expectations for all students. | • Support achievement of Essential Academic Learning Requirements<br>• Provide "technology literacy" for 21st century citizens |
| | Curriculum, instruction, and assessment aligned with standards | • Support content delivery and enhancements<br>• Facilitate gathering, analyzing, and synthesizing assessment data in meaningful ways |
| | Frequent monitoring of learning and teaching | • Make monitoring less burdensome and more focused<br>• Provide diagnostic tools for learners |
| *Goal 2—All students in Washington have high quality educators, staff and educational leaders supporting their success* | Clear and Shared Focus | • Communicate expectations to educators, staff, and educational leaders<br>• Support "buy-in" to clear and shared focus |
| | Effective school leadership | • Define the critical role of technology literacy for successful 21st century educators and educational leaders |
| | High levels of collaboration and communication | • Make collaboration and communication more effective and efficient |
| | Curriculum, instruction, and assessment aligned with standards | • Support content delivery and enhancements<br>• Facilitate gathering, analyzing, and synthesizing assessment data to inform instructional practice |
| | Frequent monitoring of learning and teaching | • Provide diagnostic recommendations for instructional strategies |
| | Focused professional development | • Facilitate gathering, analyzing, and synthesizing assessment data to inform professional development<br>• Enhance professional development delivery |
| *Goal 3—All students learn in a safe, civil, healthy, and engaging environment* | High levels of collaboration and communication | • Enhance collaboration and communication for students with special needs students and multiple learning styles |
| | Supportive learning environment | Provide appropriate:<br>• Delivery of learning resources<br>• Delivery of support resources |
| | High level of family and community involvement | • Enhance family and community outreach strategies to facilitate interaction and meaningful participation |

| Strategic Goal | Characteristics of High Performing Schools | Educational Technology Contribution |
|---|---|---|
| *Goal 4—All OSPI staff use integrated, sound management and operational practices to ensure excellence in internal and external customer services* | Clear and shared focus | Provide:<br>• School Improvement Planning Web Tool<br>• Report Card Web Site<br>• Possible statewide educational portal |
| | High levels of collaboration and communication | Provide:<br>• Core Student Record System/Electronic Data System/Assessment Information<br>• Certification Project/Professional Growth Plans<br>• OSPI electronic communications and updates |
| | Curriculum, Instruction and Assessment Aligned with Standards | Provide:<br>• Online Curricular, Instruction, and Assessment Resources<br>• Sharing of exemplary materials developed by fellow educators, peer review opportunities |
| | Focused Professional Development | Provide:<br>• Technical support and responses to frequently asked questions<br>• Research for educators and educational stakeholders on effective practices<br>• Clearinghouse of professional development opportunities |

## *4.3 INTERDEPENDENT STAKEHOLDERS AND SYSTEMS*

Multiple stakeholders are involved in educational technology. The primary stakeholders are:

- *Policy makers*, including state and federal legislators and other policy makers.
- *Funders*, including state and federal legislators, philanthropic organizations, and the business community.
- *Certification and professional development providers*, including schools of education and in-service and continuing education providers.
- *School educational leaders*, including school boards, superintendents, principals, curriculum, instruction, and assessment specialists, and other administrative professionals.
- *Teachers.*
- *Students*, including special need populations such as special education, bilingual, low income, migrant, and Native American students.
- *Network administrators.*

- *Parents and community members.*
- *Lifelong learning providers*, including community and technical colleges, and universities.

Each stakeholder brings a unique perspective. The educational technology plan recognizes the unique perspectives of multiple stakeholders and their interdependence. For each stakeholder group, the ETAC seeks to convey three fundamental objectives: *Engage, enable, and empower:*

- *Engage* stakeholders in educational technology.
- *Enable* stakeholders to adopt appropriate technology suited to their particular needs and strengths.
- *Empower* stakeholders with the essential leadership, resources, and encouragement to succeed.

## *4.4 Teaching Philosophy Matters When it Comes to Educational Technology*

Another key concept is teaching philosophy. Teaching philosophy matters when it comes to effective and appropriate educational technology use. The two philosophical poles are “instruction” versus “construction,” or, in the case of educational technology, “learning ‘from’ computers” versus “learning ‘with’ technology” (Ringstaff and Kelley, 2002). Table 4.2 shows some of the principal differences between a transmission pedagogy (instruction) versus a constructivist (construction) pedagogy.

*Table 4.2. Teaching Philosophies*

| Activity and Roles | Teaching Philosophies | |
|---|---|---|
| | **Instruction** | **Construction** |
| Classroom activity | Teacher-centered, didactic | Learner-centered, interactive |
| Teacher role | Fact teller, always expert | Collaborative, sometimes learner |
| Student role | Listener, always learner | Collaborator, sometimes expert |
| Instructional emphasis | Facts, memorization | Relationships, inquiry and investigation |
| Concept of knowledge | Accumulation of facts | Transformation of facts |
| Demonstration of success | Quantity | Quality of understanding |
| Assessment | Norm-referenced | Criterion-referenced, portfolios and performance |
| Technology use | Drill and practice | Communication, collaboration, information access, expression |

Source: Sandholtz, Ringstaff, and Dwyer (1997): cited in Ringstaff and Kelley (2002)

Constructivism is a learning theory that claims that understanding "comes from a person's effortful activity to integrate newly communicated claims and ideas with his own prior beliefs and understandings" (Becker, 2000: 11). The two pedagogical underpinnings for a constructivist approach are 1) attending to the "meaningfulness" of instructional support for each student that matches the student's personal experience, and 2) developing a student's capacity to understand a subject deeply enough so the student knows when and how to apply knowledge to a particular circumstance.

Henry Jay Becker's review of the 1998 Teaching, Learning, and Computing (TLC) survey, administered to 4,000 teachers in over 1,100 schools nationwide, showed that there is a strong relationship between teachers' general philosophical viewpoint about what constitutes good teaching and the particular objectives they view as most important in using computers with students. Specifically, Becker's (2000) analysis of the TLC survey found statistical relationships in teachers' responses between philosophical preference (transmission-oriented teaching versus constructivist compatible teaching), objectives for computer use, and the types of software used frequently with students.[12] Computer-using teachers are more likely to have a constructivist philosophy than non-using teachers (Becker, 2000).

While recognizing that no "one size fits all," especially when it comes to teaching philosophy, certain teaching philosophies may enable a more appropriate and effective teaching strategy (or set of strategies) with educational technology. Some researchers express their preference for a constructivist or student-centered approach as "better suited to fully realizing the potential of computer-based technology" (Ringstaff and Kelley, 2002: 2; see also Becker, 2000; Becker, 1999).

Other researchers take a more embracing perspective. The Metiri Group developed a "range of use" chart to "help educators 'see' that:

- instructional approach, level of challenge, and authenticity matter;
- low performing students don't have to be relegated to drill and practice, or integrated learning systems, but can learn the basics as they engage across a range of uses; and
- all uses are valide [sic] provided they truly meet learners' needs."[13]

Certain instructional approaches to learning may better lend themselves to educational technology applications than others. On one end of the spectrum, a didactic learning approach may favor drill and practice so elementary students can learn computer basics. A middle ground approach may entail coaching students through appropriate computer-based applications. Finally, a constructivist learning approach may emphasize higher order thinking skills at the high school level, for instance, problem solving with real data sets on the Internet.

To summarize, instead of asking what kind of educational technology a teacher requires, the question might be more appropriately framed as, *"What is the school's teaching philosophy and how can educational technology most effectively address students' needs within that philosophical framework?"*

## *4.5 DEFINITIONS OF TECHNOLOGY LITERACY AND FLUENCY*

One of the goals of Title II, Part D of the No Child Left Behind Act of 2001 (NCLB) is to assist every student in crossing the digital divide by ensuring that every student is technologically literate by the time the student finishes the eighth grade, regardless of the student's race, ethnicity, gender, family income, geographic location, or disability. Defining technology literacy, though, was left up to each state.

In 2002, the State Educational Technology Directors Association (SETDA) convened a Technology Literacy Assessment (TLA) Work Group at its 2002 National Leadership Institute (NLI) to establish a shared definition of technology literacy for states to use as a starting place for their state-specific definition and guidelines. The 2005 Washington State Technology Literacy for Students Working Group used this common definition as a starting place for its work:

> ***"****Technology literacy is the ability to responsibly use appropriate technology to communicate, solve problems, and access, manage, integrate, evaluate, and create information to improve learning in all subject areas and to acquire lifelong knowledge and skills in the 21st century."*[14]

The Technology Literacy Working Group also re-visited the Seven Essential Learnings for Technology from the 1994 Washington State Technology Plan[15] and the Technology Foundation Standards for Students adopted in the 2002 Washington State Educational Technology Plan[16] from the National Educational Technology Standards (NETS) for Students[17]. In addition, they reviewed the work of the Partnership for 21st Century Skills (2003)[18], the "Digital Transformation: A Framework for ICT Literacy" report by the Information and Communication Technologies (ICT) Panel (2002)[19], and a number of resources from school districts in Washington and other states and countries.

As a result, the Working Group concluded that technology literacy should not be limited to primarily the mastery of technical skills, but needed to be broadened to include general literacy skills, as well as critical thinking and problem solving. As a result, they expanded the definition to include "technology fluency", drawing upon the work of the National Resource Council in the publication Being Fluent with Information Technology:

> *"People fluent with information technology are able to express themselves creatively, to reformulate knowledge, and to synthesize new information. Fluency with information technology entails a process of lifelong learning in which individuals continually apply what they know to adapt to change and acquire more knowledge to be more effective at applying information technology to their work and personal lives."*[20]

### Definitions of Technology Literacy and Fluency

**Technology literacy** is the ability to responsibly, creatively, and effectively use appropriate technology to:

- communicate;
- access, collect, manage, integrate, and evaluate information;
- solve problems and create solutions;
- build and share knowledge; and
- improve and enhance learning in all subject areas and experiences.

**Technology fluency** builds upon technology literacy and is demonstrated when students:

- apply technology to real-world experiences;
- adapt to changing technologies;
- modify current and create new technologies; and
- personalize technology to meet personal needs, interests, and learning styles.

## *4.6 Definition of Technology Integration*

One of the challenges in the effective use of educational technology is the lack of a common understanding of what it "looks like" when it is integrated in the curriculum. For example, when school principals in one state were surveyed to determine the extent of technology integration in the curriculum in their schools, the following responses were cited as examples of integration:

- use of an integrated learning system in a subject;
- allowing, encouraging, or requiring students to use word processing and presentation software in reports and displays;
- requiring papers to be done on a word processor;
- using presentation software and projection technology for teacher presentations; and
- using computers for on-line testing and analysis of test results[21].

Although requiring students to use word processors or other software can increase their literacy and technology skills, it is only a part of technology integration. Similarly, although access to online information sources can assist students in enriching their projects, it also is only one step toward integration. Teaching students how to use electronic presentation tools can be a powerful aid to improving students' communication skills, yet this too is only partial integration. The use of computer

programs **alone** is not the full definition of integration, and the use of it does not mean that technology integration has fully occurred. Technology integration is occurring if:

- teachers are trained in a full range of technology uses and in the determination of their appropriate roles and applications;
- teachers and students routinely turn to technology when needed; and
- teachers and students are empowered and supported in carrying out those choices.

Under these conditions, the potential of digital technologies to improve teaching and learning is likely to be realized.[22]

In an overview of the status of the integration of instructional technology in public education, Earle writes: "[Technology] Integration is defined not by the amount or type of technology used, but by how and why it is used." (Rodney Earle, 2002) [23] Thus, as educators in the state of Washington met to define technology integration, they chose to do in the context of describing the "Elements of Powerful 21st Century Learning Environments."

### Elements of Powerful 21st Century Learning Environments[24]

- Educators use technology to create rich environments where student work shows evidence of conceptual understanding beyond recall.
- Educators use technology to encourage students to engage in activities that develop understanding and create personal meaning through reflection.
- Educators use technology to provide opportunities for students to apply knowledge in real world contexts.
- Educators and students incorporate suitable technology to engage in active participation, exploration, and research.
- Educators use technology to provide diverse and culturally relevant experiences to help students develop an understanding of our world.
- Educators use technology to enhance and differentiate instruction in order to present students with a challenging curriculum designed to help each individual student develop a depth of understanding and critical thinking skills.
- Educators use technology for meaningful assessment data that informs their practice and allows students to exhibit higher order thinking and to demonstrate knowledge.
- Educators use and facilitate student use of technology to communicate, collaborate, and create communities with educators, parents, students, and additional stakeholders.

The phrase “use technology” should be seen as a continuum of constantly increasing skills that employs the appropriate cognitive demand as defined in Bloom’s Taxonomy and includes concepts such as: incorporate, exploit, leverage, employ, etc.

All of the above components are in support of Washington State’s learning goals and the state Essential Academic Learning Requirements and Grade Level Expectations.

## *4.7 Definition of Technology Essential Conditions*

The powerful teaching and learning activities described above depend on more than just the technology. Certain conditions are necessary for schools to effectively use technology for learning, teaching, and educational management. Physical, human, financial, and policy dimensions greatly affect the success of technology use in schools.

A combination of **Technology Essential Conditions**[25] are required to create equitable learning environments conducive to powerful uses of technology[26], including:

- Forward-Thinking, Shared Vision
    - Vision, Planning, and Policy
    - Student Technology Literacy Standards
    - Technology Standards for Teachers
    - Technology Standards for Education Leaders & Staff
    - Community Connections
- Technology Administration and Support Focused on Teaching and Learning
    - Technology Support
    - Instructional Technology Staffing
    - Adequate Ongoing Funding
    - Electronic Data Support Systems
- Technology Capacity, Equity, & Access to Support Teaching and Learning
    - Student Access to Technology
    - Teacher/Education Leader/Staff Access to Technology
    - Aligned Curriculum-based Tools & Online Resources
    - Network Capability/Internet Access/Video Capacity
- Leadership and Professional Development to Improve Teaching and Learning
    - Leadership/Learning Community
    - Technology Professional Development Plan & Funding
    - Models & Content of Professional Development
- Student-Centered 21st Century Learning Environment
    - Student Use of Technology
    - Technology Integration

# *5.0 State of the State*

This section discusses the state of educational technology in Washington State, including statewide technology dissemination since education reform was initiated in Washington State, district initiatives, regional and statewide initiatives, and activities underway at the state level by OSPI and the Governor. Funding is derived from a variety of local, state, federal, and private sources.

## *5.1 WASHINGTON HAS MULTIPLE EDUCATIONAL TECHNOLOGY INITIATIVES UNDERWAY*

Multiple educational technology activities are underway and under development throughout Washington State at the school building, district, regional, state, and federal levels. Many of these efforts involve public and private partnerships.

Multiple stakeholders are involved in various educational technology initiatives. Although an exhaustive program listing is beyond the scope of the educational technology plan, the initiatives described here provide a sense of the depth, breadth, and heterogeneous nature of educational technology initiatives currently underway in Washington State. Appendix E, Educational Technology Initiatives, provides an overview of the initiatives. Appendix B, Bibliography, provides additional information on program sponsorship and specific activities. Individual initiatives vary greatly in terms of:

- Program scope.
- Program content, e.g., math skills development versus assistive technology applications for disabled students.
- Targeted populations (primarily teachers and students, but also involving network administrators, school educational leaders, policy makers, and researchers).
- Overall funding, funding methods, and funding support over time.
- Implementation timeframe.
- Specific technology applications.

This high degree of variability highlights the need for a dynamic statewide process to align current educational technology initiatives so that schools, policy makers, and other stakeholders can assess progress effectively.

Another issue is the degree of overlap and unique features of individual initiatives. As shown in Table 5.1, four categories are used to disaggregate somewhat the various program initiatives:

1. *Learning and Teaching Initiatives*—these initiatives include teacher and student applications, Internet and other educational technology resources, and program content and delivery strategies.
2. *Professional Development to Support Technology Integration into Curriculum and Instruction*—a particular focus is on teacher professional development strategies to infuse educational technology into curriculum and instructional practice.
3. *Networking and Connectivity*—primarily focuses on describing the current status of the K-20 Educational Telecommunications Network.
4. *Technology Support for Education Reform*—describes not so much the application of educational technology *per se*, but instead focuses on how technology is being applied to address education reform objectives statewide through classroom, district, regional, and statewide school improvement planning tools, assessment tools, and Web-based information relating to Washington's education reform efforts.

Generally, the initiatives described have statewide applicability, are supported through dedicated funding at the state, federal, or foundation level, and have been implemented for a minimum of two years.

*Table 5.1. Educational Technology Initiatives in Washington State*

| Initiative | Short Description | Sponsors | | | | |
|---|---|---|---|---|---|---|
| | | School Districts, ESDs | State | Federal | Private | Other Partnerships |
| **LEARNING AND TEACHING INITIATIVES** | | | | | | |
| Assistive Technology Projects | Includes the SRVOP Project for deaf children, their families and educators; the Technology and Learning Disabilities Project; and the Washington Assistive Technology Alliance | ✓ | | ✓ | | ✓ |
| Digital Learning Commons | Web-based portal where students and teachers have access to high quality digital resources, teaching and learning tools, and online courses | ✓ | ✓ | | ✓ | |
| Generation YES Project | Students collaborate with teachers in restructuring education through educational technology | ✓ | | | ✓ | |
| High Tech Learning Centers | Information technology (IT) education leading to industry certification and/or higher education | ✓ | | | | |
| MarcoPolo Online Resources | Internet content developed by experts for K-12 classroom applications | ✓ | ✓ | | ✓ | |
| NO LIMIT Project | Improve math skills through technology integration | ✓ | | ✓ | | |
| Online Buying Cooperatives | Product purchases through ETSC program | ✓ | ✓ | | | |
| Online Courses | Online courses offered through districts | ✓ | | | | |
| ProQuest Online Database | Access to over 3,000 magazine titles and various newspapers and databases | ✓ | | | ✓ | ✓ |
| SHARE Project | Multiple schools involved in providing online communication, newsletters, research, web-page development, publication of student work, project-based curriculum | ✓ | | | | |

| Initiative | Short Description | Sponsors | | | | |
|---|---|---|---|---|---|---|
| | | School Districts, ESDs | State | Federal | Private | Other Partnerships |
| UW Distance Learning Courses | Distance education to provide college-level courses for K-12 students, and related online course development | | ✓ | | | ✓ |
| Washington State LASER | K-8 science education reform initiative | ✓ | ✓ | ✓ | | ✓ |
| **PROFESSIONAL DEVELOPMENT TO SUPPORT TECHNOLOGY INTEGRATION** | | | | | | |
| ETSC Program | Support OSPI-directed technology initiatives; Collaboration; Professional development; Information dissemination; Support regional technology leadership and district technology planning. | ✓ | ✓ | | | |
| PILOT Tool | Professional development, assessment, information sharing | ✓ | ✓ | | | |
| **NETWORKING AND CONNECTIVITY** | | | | | | |
| The K-20 Network | High-speed educational telecommunications network | ✓ | ✓ | | | |
| Internet 2 ("Abilene") | Next generation Internet | | | | | ✓ |
| **TECHNOLOGY SUPPORT FOR EDUCATION REFORM** | | | | | | |
| Online Statewide Educational Standards | Essential Academic Learning Standards (EALRs) and GLEs online | | ✓ | | | |
| Report Card Web Site | Online application for researching and evaluating education data, including demographic and test score information | | ✓ | | | |
| School Improvement Planning Web Tool | Collect and analyze data to determine the effectiveness of school programs and services | | ✓ | | | |

*Note: Initiatives listed in alphabetical order.*

## *5.2 EDUCATIONAL TECHNOLOGY FUNDING IS DERIVED FROM MULTIPLE SOURCES*

This section provides a review of funding for educational technology along with recent state and federal allocations earmarked specifically for educational technology purposes. Although there are no comprehensive statewide data on funding sources and total expenditures for educational technology in Washington State, survey findings from the Technology Alliance and OSPI provide some data on funding practices and overall expenditures.

### Overview of Educational Technology Funding

The tremendous advancement in educational technology from 1994 to present is no doubt due to funding from a variety of public and private resources.

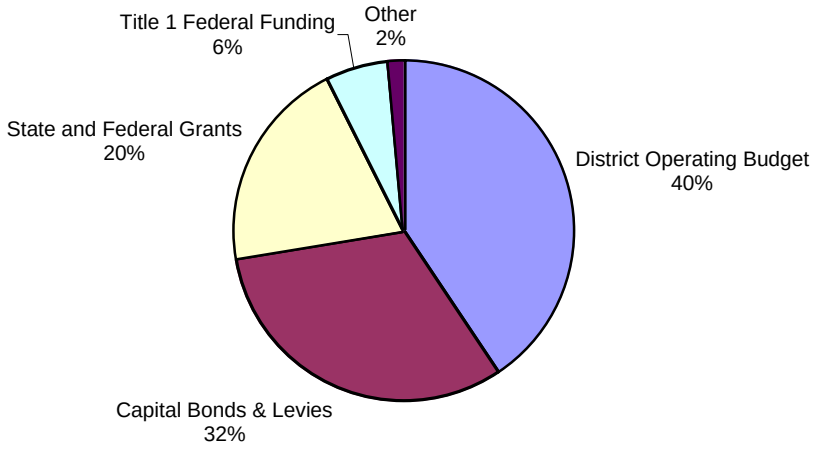
In a survey conducted by the Technology Alliance (1998), districts reported that educational technology funding was derived from several local, state, and federal sources (*Figure 5.1*).

In 2000, per-pupil spending on educational technology in Washington State averaged $120, down slightly from $133 in 1998. There is a very wide range in the per-pupil amount, from $8 per pupil to $667 per pupil. District operating budgets provide the largest single source of funding for educational technology, followed by bonds and levies. Districts with higher per-pupil property assessments continue to be more likely to spend more per student than those with lower per-pupil property assessments (Friedman and Erickson, 2000).

Overall, about one in four districts (28 percent) considered less than half of their funding to be secure. On the other hand, 32 percent of districts considered most of their funding to be secure, a significant improvement since 1998 (Friedman and Erickson, 2000).

In terms of district spending priorities, national data suggest that funding for professional development should be a priority yet most funding is devoted to hardware (67 percent) and software (20 percent), with about 14 percent going to staff development (Education Week, 2002). Educational technology experts suggest the opposite: “Organizations should spend 30 percent of their technology budget on equipment and 70 percent on the ‘human infrastructure’ to support ongoing training and technical assistance” (White, Ringstaff, and Kelley, 2002: 5).

*Figure 5.1. School Educational Technology Funding Sources*




Source: Technology Alliance (1998). Based on a fax-back survey to Washington's 296 school districts. 227 districts responded, a response rate of 78 percent representing 82 percent of total state enrollment.

## Local Funding for Educational Technology

Local funding, including capital bonds and levies, is the second largest source of educational technology funding.

### *Bonds and Levies*

Article 7 of the State Constitution and chapter 84.52 RCW give school districts authority to levy property taxes. There are four types of levies:

1) Excess general fund levies
2) Debt service fund levies
3) Transportation vehicle fund levies
4) Capital project fund levies

The voters of the school district must approve such levies by a 60 percent "Yes" vote in a district-wide election. School districts may run a levy for a particular fund only two times in a calendar year. Unsuccessful levies may be resubmitted in subsequent years (Bigelow, Jones, and Stead, 2002).

Excess general fund levies are used for day-to-day operations of the schools, commonly known as school district maintenance and operation (M&O) levies. M&O levies can be used to pay for training, to finance the purchase of instructional materials including software and other computer-related materials, and to replace equipment including hardware (Technology Alliance, 1998). The majority of local funding for school district

maintenance and operations (M&O) is derived from local tax levies. Statewide, local sources provided over 19 percent of school district revenues in the 2000-01 school year, with levy proceeds comprising most of this funding (Bigelow, Jones, and Stead, 2002).

The major source of support for acquiring educational technology for the classroom, besides reprioritizing within general apportionment, has been the local special property tax levy (special levy). School districts are authorized to propose to local voters special levies for maintenance and operations purposes, capital projects, or other more specific purposes. Both maintenance and operations and capital projects special levies may be used by a school district to meet its needs for digital technology. In fact, a number of school districts have gone to their voters and received permission to collect additional revenues solely to support additional technology. This practice has led to a disparity among school districts in acquiring digital technology based on the willingness of the local taxpayers to approve special levies and the availability of private funds.

In addition to M&O levies, districts have the authority to raise levies for debt service, capital projects, and transportation needs. Other local revenue is derived from timber excise tax, school lunches, investment earnings, various fees, interdistrict cooperatives, grants, and donations.

Capital levies can be used to pay for school construction or remodeling. Computers are considered to be a type of equipment and computer acquisition is permissible. However, such bond proceeds may not be used to replace equipment. Two to six-year capital levies may be used to buy computers apart from a construction project if the acquisition is part of a system upgrade. Library, text, and reference books in digital format may be purchased as part of a construction project. Capital levies may also be used to finance the modernization of a computer system or facility (Technology Alliance, 1998).

The supermajority requirement of 60 percent further limits the ability of districts to raise revenues for educational technology initiatives. In 2001, 275 of the state's 296 school districts passed General Fund M&O levies. The average revenue per Full Time Equivalent (FTE) student statewide was $1,105. Seventeen districts did not submit a levy. Four districts attempted levies for 2001 but failed to gain voter approval (Bigelow, Jones, and Stead, 2002).

Capital bonds and levies provide a significant source of funding for school district educational technology efforts; however, capital bonds and levy funding may be regarded as unstable and limited in terms of what type of educational technology efforts may be pursued.

Capital bonds and levies have other major limitations as funding sources, because legal opinions and school district interpretations of state laws have tended to limit these expenditures to initial hardware purchases, or to hardware bundled with pre-installed software. This often means that important needs such as staff development, maintenance and technical support are inadequately funded, leading to ineffective use of the technology or computers sitting unused. Many school districts in economically

depressed regions are not able to get voter approval for local bonds and levies. Therefore, there tends to be educational technology inequities between districts in technology expenditures, and consequently in the quality and quantity of technology programs available for instructional purposes.

At the policy level, persistent differences between high valuation and low valuation districts may create educational technology adequacy and equity issues, especially as poorer districts try to play “catch-up” with their more affluent counterparts. The Technology Alliance 1998 survey and a follow-up survey in 2000 found a positive correlation between district property values and technology spending per pupil and a negative correlation between student participation in the free and reduced-price lunch program and technology spending. That is, wealthier districts and those with fewer children in the free and reduced-price lunch program tend to make higher per-pupil expenditures on educational technology (Technology Alliance, 1998; Friedman and Erickson, 2000).

State Funding for Educational Technology

Washington State has a long history of supporting educational technology, including:

- In-service training for educational technology instruction.
- Ongoing support for Educational Service District educational technology programs through the Educational Technology Support Center Program.
- Equipment purchases.
- Educational technology grants to improve educator professional development and student achievement.

During the 2005-2007 biennium, the state continued to provide funding to support educational technology in K-12 schools. The Legislature provided monies for the on-going support of the K-20 Network, which connects school districts, educational service districts (ESDs), community colleges, and the four-year colleges and universities to one another and the Internet. All nine ESDs, 294 school districts, the schools for the deaf and blind students, and OSPI are connected to the network. Currently over 98 percent of K-12 classrooms in Washington State have access to the Internet via the K-20 Network.

The monies provided for the on-going support of the K-20 Network included $3.9 million biennially to fund the Regional Institutional Technical Units at the nine ESDs, which provide technical support specifically for K-12 schools. It also included funding for K-12 transport and maintenance costs not covered by participant co-payments, as well as funding for the KOCO network operations that jointly support all of the K-20 Network.

The Legislature also provided $3.9 million during the 2005-07 biennium for the Educational Technology Support Center (ETSC) Program and OSPI staff to provide statewide leadership in technology.

Currently there is no dedicated funding source for educational technology, i.e., through a state revolving fund dedicated to educational technology or through a formula-driven apportionment process. Consequently, continued funding for educational technology at the state level relies on biennial and supplemental appropriations, creating challenges for effective long-range planning.

## Federal Funding for Educational Technology

The federal government's share of seven percent of overall education funding is relatively small. Enhancing Education Through Technology is the primary source of federal educational technology funding under the Elementary and Secondary Education Act (ESEA). As shown in Table 5.2, a total of just over $6.54 million was allocated to Washington State for fiscal year 2005-06, with 5 percent ($325,000) allocated to OSPI for program administration and technical assistance. The remainder was divided evenly between competitive grants and flow-through funds to districts (as required by the legislation), with $3,018,238 each in competitive grants and flow-through dollars.

*Table 5.2. Title II, Part D - Enhancing Education Through Technology (EETT) Funding for Washington State 2005-2006*

| Item | Amount | Notes |
|---|---|---|
| Administration | $325,000 | |
| Flow-Through to School Districts (formula driven) | $3,108,238 | Distributed via iGrants grant system; based on Title I allocation percentages for each district; average of about $3.00 per student.<br>Districts may transfer up to 50 percent of funds to Title I or other programs as long as funding is used to improve learning with educational technology.<br>Requirements:<br>• For improving student achievement through the use of technology.<br>• For improving student achievement through use of technology.<br>• Must spend at least 25 percent on professional development on integrating technology into curriculum.<br>Deliverables:<br>• Improved student technology literacy.<br>• Improved teacher quality in infusing technology into curriculum. |
| Competitive Grants to School Districts | $3,018,238 | All devoted to Year 1 of "No LIMIT" Project, in partnership with all nine ESDs and the Special Education Technology Center in Ellensburg (Appendix E provides additional information on the No LIMIT Project).<br>Awarded in 2005-06 to 298 grade 5-9 math classrooms in 76 school buildings to improve learning through infusion of technology in mathematics.<br>Evaluation over 2 years by Western Washington University for all participants in a statewide, comprehensive approach. |
| **TOTAL** | **$6,450,000** | |

## Other Funding Sources

Funding provided by other sources is small (estimated at less than two percent of total educational technology funding). However, these resources provide essential services and they perform roles that might not otherwise be supported.

Other funding sources include philanthropic sources (private organizations), public-private partnerships, and individual donations or in-kind community support. The support can include direct financial assistance to individual school districts or hosting a technical assistance website or professional development training venue. Appendix E provides a review of such initiatives. Many of these initiatives highlight innovative and targeted approaches to infusing educational technology into curriculum, instruction, and assessment practices, professional development, network support, and educational leadership. Standard-setting bodies such as the International Society for Technology in Education (ISTE) have taken on a leadership role in developing educational technology standards for teachers, students, and administrators. Private and non-profit foundations supported by the Bill & Melinda Gates Foundation, Intel, Apple, and others have provided targeted support to high-need schools and have identified policy issues for legislative consideration.

# *6.0 Gap Analysis*

The gap analysis presented in this section provides several comparisons of Washington's educational technology efforts:

- How Washington compares nationally.
- What the significant shortfalls are based on the national literature and concurrent trends in Washington State.
- Specific issue areas such as students with special needs and educational technology equity between districts.
- Summary of major trend lines and projections.

The analysis provides strong support for the recommendations and priority action items developed by the Educational Technology Advisory Committee and described in Section 7.

## *6.1 Overview of Washington's Educational Technology Progress*

How does educational technology contribute to, strengthen, and refine Washington's educational reform efforts? This was the genesis for the educational technology plan in 1994 and is the same question that policy makers and educators are asking today. By some accounts, the achievements are significant.

Computers are better, faster, cheaper, and more plentiful. Educational software is more robust and plentiful. The Internet—a tool used mainly by researchers and government agencies in 1994—today hosts a variety of curriculum, instruction, and assessment offerings for educators and students at school and at home. Educational technology provides professional development, administrative, and distance learning opportunities. Alternative media—including videoconferencing, personal digital assistants, and telecommunications devices—are a reality for many schools. And the K-20 network provides a reliable network for providing high-speed telecommunications to 475 public education sites statewide.

Educational technology has increased substantially since 1994, when Washington's first educational technology plan was adopted. Nationally, there has been significant progress on almost every measure of educational technology, including technology availability at schools, use of educational technology in instructional settings, ratio of computers to students, and availability of educational technology outside of the schools at students' homes and in the broader community. Washington State tends to reflect these trends, as described below.

However, persistent issues remain nationally and in Washington State, including:

- Gaps in access and use of educational technology between minority and poor students and their counterparts.
- Limited infusion of educational technology into curriculum, instruction, and assessment practices.
- Lack of consolidated, sustained funding to support educational technology applications.
- Lack of research on the most efficient ways to infuse educational technology into specific programs.
- Policies and practices that hinder students in making full use of educational technology, even when it is available and accessible.
- Too much reliance on hardware allocations at the cost of professional development and network staffing support.

National trends in educational technology are described below, followed by a closer examination of educational technology in Washington's schools.

## *6.2 Significant Growth in Rise & Use of Educational Technology 1994 to 2005*

Across schools in the United States the availability of technology for instructional purposes has increased tremendously. In 2000, four in five students (about 80 percent) reported using computers at school (Newberger, 2001). Although gaps persist between those who have access to educational technology, the period between the first educational technology plan in 1994 and today is striking in many respects, most notably in the widespread dissemination of educational technology networks, hardware, and increasing computing speed and diverse applications. At the same time, the ability to harness educational technology effectively, efficiently, and appropriately in classroom and other instructional settings raises continuing challenges and unresolved issues.

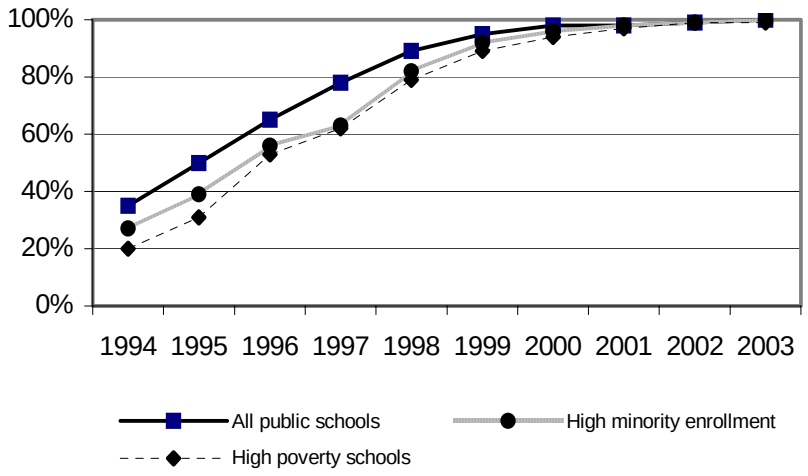
There are many discrete types of educational technology and associated applications such as the Internet, handheld devices, computers and associated software systems. This section first discusses Internet access due to its widespread adoption and application in multiple learning activities and its incorporation of a wide variety of educational technologies, such as electronic mail, videoconferencing, and distance learning.

## Internet Access at School is Widespread

By 2003, nearly all K-12 public schools were connected to the Internet, compared with 35 percent in 1994 (*Figure 6.1*), with "some sort of access to the Internet, someplace in their building."[27] The significant increase in Internet access may have been aided by the federal Education rate (E-rate) program. The E-rate program was established in 1996 to make discounted telecommunications services, Internet access, and internal connections available to schools and libraries, based on student income and rural or urban location (Cattagni and Farris, 2001). In 2001, 59 percent of all students reported using the Internet at school, with over 70 percent of high school students using the Internet at school.

Changes have also taken place in the types of network connections and the speed at which they are connected to the Internet. Not surprisingly, connections are more frequently dedicated-line Internet connections and they provide faster and more reliable access (Cattagni and Farris, 2001).

*Figure 6.1. Percent of Public Schools with Internet Access, by School Characteristics: 1994-2003*




*Note:*

*High minority enrollment = 50 percent of more of student population.*

*High poverty schools = 75 percent or more of students eligible for free or reduced-price school lunch*

*Source: Internet Access in U.S. Public Schools and Classrooms, 1994-2003, NCES*

Internet Access After Class and At Home

In 2003, 48 percent of public schools offered computers with Internet access to students outside of regular school hours. Secondary schools were more likely to make the Internet available to students outside or regular school hours than elementary schools (69 percent compared to 41 percent), as were larger schools. Large, secondary schools are thus most likely to offer the use of after-school computers with Internet access. Of the schools making the Internet available to students outside of regular schools hours, almost all (98 percent) made it available after school, 17 percent made it available before school, and 9 percent made it available on weekends (NCES, 2003).

More children have access to a computer or use the Internet at home. By August 2000, 54 million households in the United States, about one out of every two households (51 percent), had one or more computers. Of these, 44 million households (42 percent of all households) had Internet access. In comparison, about one in four households had a computer in 1993. In 1997, the first year in which the Census Bureau collected information on Internet use, one in five households had Internet access (18 percent) (Newberger, 2001).

Nearly two out of every three children has access to a computer at home. Older children are more likely to use the computer at home. White non-Hispanics and Asians and Pacific Islanders are most likely to have a computer at home. Not surprisingly, high-income households are more likely to have computers or Internet access. About 90 percent of children in high-income households earning $75,000 or more per year had a computer at home. Only one in three children in low-income households earning $15,000 or less per year had a computer at home. Furthermore, compared to their wealthier counterparts, low-income children are more likely to use computers for games rather than for schoolwork, word processing, and other software applications (Becker, H., cited in Wilhelm, Carmen, and Reynolds, 2001).

School has the potential to be the great equalizer in terms of computer and Internet access. For children 6 to 17 years old, computer use at school is more nearly equal across income, race, and ethnicity than computer access at home (Newberger, 2001). Yet although the gap in access both at home and at school has declined, high poverty and high minority school children are less likely to have dedicated Internet access at home or at school (Newberger, 2001; Cattagni and Harris, 2001). Continuing disparities in educational technology access raises concerns about disproportionate access for children at risk who have the highest need for educational technology. For instance, Project TELL – a long-running demonstration project in New York City – found that at-risk youth with access to home computers and network availability in an online learning community scored substantially higher than their control group peers on standardized reading and math tests (Kornblum, W., 1998; cited in Wilhelm, Carmen, and Reynolds, 2002). Consequently, while the gap is narrowing, a gap nevertheless remains in access to educational technology.

## Internet Applications

How the Internet is used, rather than simply having access, is of interest to policy makers and to educators alike.

### *Student Use of the Internet*

The most frequently cited uses of the Internet by children at home are e-mail, school research or courses, information searches, and checking news, weather, and sports (Newberger, 2001). Students rely on the Internet to help them do their schoolwork and use the Internet for multiple education-related activities. Five metaphors of Internet use have been identified through student focus groups (Levin and Arafeh, 2002):

- "Virtual textbook and reference library"—a place to find primary and secondary source material.
- "Virtual tutor and study shortcut"—a place to receive instruction about material that is interesting or confusing, or as a way to complete schoolwork as quickly and painlessly as possible, and for some, using the Internet to plagiarize material or otherwise cheat.
- "Virtual study group"—a collaboration tool with other students.
- "Virtual guidance counselor"—a place to seek guidance relating to school, careers, and post-secondary education.
- "Virtual locker, backpack, and notebook"—a place to store important school-related materials and to transport books and papers, and a place to keep track of class schedules, syllabi, assignments, notes, and papers.

### *Teacher and Professional Use of the Internet*

Most teachers (68 percent) report making some use of the Internet in their professional activities. Almost half of teachers use the Internet weekly or more frequently. (Becker, 1999). Teachers most frequently use the Internet for information searches, teacher research, lesson planning, demonstrations and presentations (National School Boards Foundation, 2002). Teachers use information from the Internet at home and at school on an equal basis. Overall, the three most important variables in predicting teachers' Internet use is (Becker, 1999):

- The teacher's level of classroom connectivity—high speed Internet classroom connectivity is one of the strongest predictors of teacher's Internet use.
- Teacher computer expertise—"Although the Internet is often presented as a novice-friendly area of computer use…relevant prior computer knowledge may be an important pre-requisite for a teacher to make the Internet a valued resource in their classroom, and valuable in their lesson preparation activities in particular." (Becker, 1999: 29)

- Teacher pedagogical beliefs and practices—Teachers who regard education as primarily the distribution of facts and skills to students are much less likely than their "constructivist" counterparts to use the Internet.

*Internet Use Policies*

A major concern of parents, school educational leaders, and policy makers is student access to inappropriate Internet material. All public schools with Internet access in Washington have "acceptable use policies" (AUPs) and use various technologies or procedures to limit inappropriate use of the Internet. These technologies or procedures include blocking or filtering software, an intranet system, honor codes for students, or teacher and staff monitoring to control student access to inappropriate material on the Internet (Cattagni and Farris, 2001).

The federal Children's Internet Protection Act (CIPA) requires districts that use E-rate funds to put "technology protection measures" into place that guard against student access to obscene materials, child pornography, and other online content that is harmful to minors. However, several issues have been raised concerning Internet use policies (Willard, 2002, Borja, 2002):

- Over-reliance on blocking technologies and other AUPs may fail to ensure that the Internet is used for high-quality educational purposes; students may simply use the Internet instead for music, games, chat rooms, and other non-instructional uses.
- Relying on third-party vendors to establish blocking protocols may relegate key acceptable use policymaking to private vendors rather than school officials, potentially creating biased or inappropriate restrictions.
- Failing to instruct students and inform parents on acceptable uses of the Internet or overly relying on blocking and filtering software to the exclusion of teaching responsible use and supervising students appropriately may lead to a "false sense of security" concerning Internet use.

## *6.3 EDUCATIONAL TECHNOLOGY ISSUES*

In critical respects educational technology use is surprisingly limited. Data from *Technology Counts*, Education Week's annual review of educational technology, suggests that, "apart from the increased use of the Internet, general use of computers in the classroom appears to be stagnant" (Education Week, 2002: 56). Over a five-year period, the level of computer use in fourth and eighth grade remained unchanged.[28] The Education Week survey also indicates that teachers who did use computers in class used them most often for traditional drill-and-practice activities or math games. Tasks promoting higher thinking skills were used much less frequently.

*Barriers to Teacher Use of Educational Technology*

Despite significant gains in the overall amount of educational technology, barriers to educational technology present significant challenges. Teachers report several issues that present barriers to their use of educational technology, including (Smerdon, et al., 2000):

- Lack of release time for professional development on how to use computers and the Internet.
- Lack of time set aside in the school schedule for students to use computers in class.
- Insufficient numbers of computers.
- Lack of good instructional software.
- Difficult Internet access.

Related problems include obsolete or poorly equipped machines (some over ten years old), wide discrepancies in educational technology accessibility from state to state and from school to school, and persistent gaps in educational technology accessibility in high poverty and high minority schools (Ringstaff and Kelley, 2002; Wilhelm, Carmen, and Reynolds, 2002).

*How* instructional computers are deployed within a school is another consideration. Class scheduling, pressure of curriculum coverage, classroom access to computer clusters, teacher skill and expertise in using computers, and teacher philosophy and objectives for computer use have been correlated with the successful application of instructional computers. Barriers to using computers include classes that are too large, accountability for teaching a specific curriculum that inhibits use of educational technology, unreliable and complicated computer systems and unwanted technology or technology that a teacher did not request (Becker, 2000).

*Educational Leadership Makes a Difference*

In addition to teacher attitudes about and use of educational technology, educational leaders and the policies they adopt can affect the ways in which students and teachers apply educational technology. In a qualitative survey of student perceptions about the Internet, students reported that administrative decisions affected levels of access to the Internet, requirements for technology literacy skills, and the amount of restrictions on student Internet access. Students also reported that, even in well connected schools, wide variation in teaching policies about Internet use in class frequently inhibits engaging curriculum and instruction with online resources. In fact, as the researchers noted, "Students repeatedly told us that the quality of their Internet-based assignments was poor and uninspiring. They want to be assigned more—and more engaging—Internet activities that are relevant to their lives. Indeed, many students assert that this would significantly improve their attitude toward school and learning" (Levin and Arafeh, 2002: iv). Other roadblocks cited by students include (Levin and Arafeh, 2002):

- Poor quality of Internet access, often limited to certain places or certain times in school with restrictive use policies.
- Blocking and filtering software creates barriers to legitimate educational use of the Internet.
- Teachers do not assign homework requiring the use of the Internet out of concern for students without access at home.

In the Apple Classrooms of Tomorrow Project (ACOT), professional development allowed participants to see expert teachers modeling instructional use of technology as they worked with students. Evaluation of the program found that principal and administrative support was critical to project success. Specifically, principals needed to provide time for participating teachers to plan and reflect together on their practices, recognize teacher efforts, and ensure that teachers had the authority and flexibility to adjust their instructional schedule and develop curriculum objectives promoting team teaching and interdisciplinary instruction (Ringstaff and Kelley, 2002).

## *6.4 Snapshot of Educational Technology in Washington Schools 1993-2005*

State trends in educational technology match those at the national level in many respects. Based on surveys and inventories that OSPI has conducted since 1992, there has been tremendous change in both the amount of technology and its use in K-12 schools in Washington State. These changes have often accompanied by an increase in complexity, leading to greater support and training requirements. In addition, networked technology has shifted from a supplemental resource to a "mission-critical" role in a number of districts, both instructionally and administratively.

In several important respects, the barriers to effective educational technology found in national studies are also evident in Washington State.

## Connectivity and Internet Access in Washington Schools

Virtually all instructional buildings in Washington State can now access the Internet, compared to 32 percent in 1994 (the earliest survey data for Washington State on this item). In addition, 98.7 percent of K-12 instructional classrooms in Washington State can now access the Internet from one or more computers in their classroom, a tremendous increase from only four percent in 1994.

Experts have suggested that a 1:4 computer-to-student ratio would provide a sufficient level of access. However, there are significant variations in the ways in which computers are disseminated in schools, whether computer labs are used, and which grade levels have access to computers. Classroom-based computers with Internet access have been associated with whether teachers use the Internet for student research (Becker, 2000; Ringstaff and Kelley, 2002). Consequently, this is a singularly important indicator of educational technology adoption in Washington's schools.

Based on this and related measures, *overall* Washington appears to closely meet the general standard of one computer for four students (*Figure 6.4*). Many classrooms, however, may fail to reach this desired ratio.

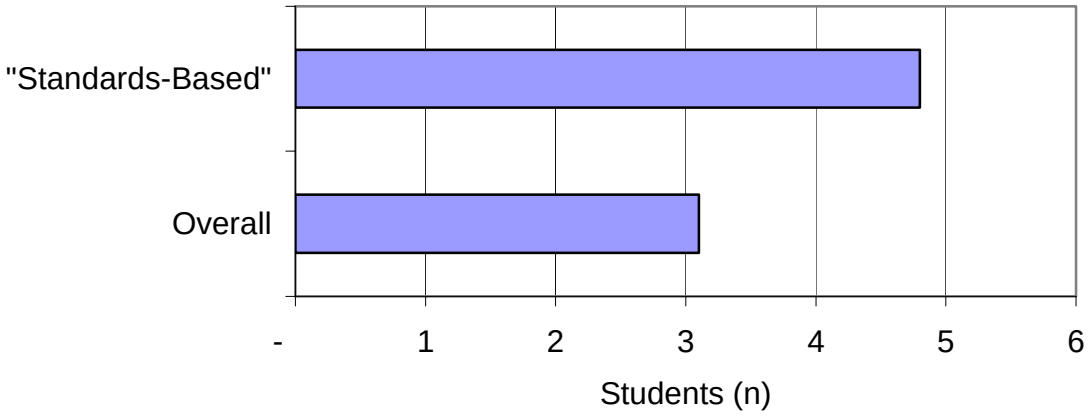
OSPI reported in its 2004 technology survey that over 71 percent of the instructional computers in use met the minimum statewide standards recommended by OSPI. The student to computer ratio for "standards-based computers" is less than 5:1, higher than the average recommended ratio of four students per computer.

### *Communication and Connectivity*

Nearly all of the approximately 55,000 K-12 certified staff in Washington State had e-mail accounts provided by their school district in 2004. Over 52,000 students (about 5 percent) have district-provided e-mail accounts. In 1993, less than one-third of teachers had e-mail accounts and student accounts were largely non-existent.

Based on United States census data, Washington State ranks fourth nationwide in the percent of children having home Internet access. More than half (60 percent) of Washington households with children ages 3-17 have Internet access at home. Nationwide, the percent of school-age children with home Internet access ranges from 69 percent (New Hampshire) to 31 percent (Mississippi) (Wilhelm, Carmen, and Reynolds, 2002).

*Figure 6.2. Selected Student-Computer Ratios*




*Note:*
*"Standards-based" computer defined as Intel or AMD based Pentium III 500 MHz or higher desktop, or Pentium II 400 MHz or higher laptop, or Mac G4/G5 450 MHz or higher desktop, or Mac G3/G4/G5 laptop.*

*Source: Office of Superintendent of Public Instruction (2004).*

## *Network Support*

Related to the issue of older or obsolescent technology is lack of network support. Teachers report that a major barrier to effective integration of educational technology into their instructional practices is due to lack of adequate support, unreliable networks and computers, or insufficient skill to operate a computer (Becker, 2000; Smerdon, et al., 2001). In the Technology Alliance survey, almost one out of five schools (18 percent) reported that they used ad hoc support (including teachers working on their own time) to install and operate computers and other technologies. In many schools, small technology departments struggle to assist multiple schools, and no schools reported a level of 1 Full Time Equivalent (FTE) technology coordinator per school (Friedman and Erickson, 2000). OSPI's 2004 survey found that 84 percent of Washington's school buildings have some level of paid technology support, averaging 4.1 hours per day.

This continued lack of adequate technology support is due to very high computer-to-technician staffing ratios in schools, periodic shortages of network administrators due to market competition, and restrictive salary requirements that preclude hiring additional staff when needed. Because of this, network staffing ratios in schools are significantly higher than within industry. OSPI estimates that in 2004 a typical network administrator in Washington's public schools supported over 320 personal computers in a school district, while her private industry counterpart supported about 40 personal computers.

The Technology Support Index, an educational technology assessment tool developed by Dr. Chip Kimball of the Lake Washington School District, describes several domains of technology support. The domains are: equipment standards, staffing and processes, professional development, and intelligent systems. Each domain is described in terms of the status of the school's technology support: "emergent," "islands," "integrated," or "exemplary" technology support. For instance, an "emergent" computer-to-technician ratio is over 250:1. An "exemplary" computer-to-technician ratio is 75:1. By this definition, Washington State school district network support overall would be considered "emergent," or "A strategy or domain that has a need for attention and improvement… in the beginning states on a developmental continuum, and if the issues aren't addressed, on-going support challenges will likely be found."[29]

Educational Technology Uses

Washington teachers and students increasingly use educational technology for learning and teaching support. Certificated staff predominantly use computers for word processing, e-mail and communications, online grading and attendance, and to a lesser degree, web research, while in 1993 word processing and stand-alone grade book programs were mainly used.

Students predominantly use computers for word processing and web research, and to a lesser degree, instructional software and drill and practice, while drill and practice was the main use of computers by students in 1993.

A small but growing number of K-12 students (10,164 in 2004) are currently enrolled in online courses, which were virtually non-existent in 1993. New initiatives, particularly the Digital Learning Commons, are promoting online learning opportunities for Washington's students.

A 2002 survey conducted by the University of Washington of 6th-12th grade students reported that non-home locations for computer use were mostly at school and school computer labs, followed by the local library. Students in upper grade levels are more likely to use computers for schoolwork in high school. Almost sixty percent of 11th and 12th graders reported that they used a computer for schoolwork four or more hours weekly. Almost half (45 percent) of early high school students (9th and 10th grade) and 30 percent of middle school students reported that they used a computer more than four hours or more weekly.

*Online Learning: Digital Learning Commons Task Force Findings*

In February 2002, then Governor Gary Locke convened a task force of leaders from education, business, and government to consider how to deliver a statewide digital education initiative quickly, effectively and equitably. The task force focused on determining a vision for the future and workable first steps to achieving it. The task force identified implementation challenges and explored relevant policy issues. The task force also learned that online coursework already plays a role in Washington schools. The task force's telephone survey determined that 13 percent of the students surveyed had taken an online class at some time during their educational life, and that over half (53 percent) of these children received credit for online courses from their school or district. Several Washington-based online schools and programs discussed in Appendix E are among the providers that students used for online coursework.

An analysis of digital education efforts in other states conducted for the task force revealed mixed success in many of these early efforts. Notably, the initial funding for several statewide, online course programs was from a one-time state government appropriation, with ongoing funding expected to come from the state entirely as a general fund line item. This lack of a self-sustaining model has left these states vulnerable during periods of state budget constraints.

Progress Compared to the 1994 Technology Plan Recommendations

The 1994 technology plan recommendations were spirited and ambitious, reflecting the newly enacted education reform legislation and Washington State's newly created plans for the education reform initiatives.

*Table 6.1* provides a summary of the 1994 technology plan recommendations (see Appendix D for the full text summary of each recommendation). Several recommendations have been successfully adopted, including:

- The development of partnerships, alliances, and public awareness (Recommendation 2).
- Affordable communications (Recommendation 3).
- Regional support for educational professionals (Recommendation 7).
- The K-20 Network (Recommendation 8).
- Electronic (online) resources (Recommendation 9).
- Educational technology policies (Recommendation 12).

*Table 6.1. 1994 Technology Plan Recommendations and Current Status*

| 1994 Technology Plan Recommendation | Current Status |
|---|---|
| 1. Integration of Technology into Educational Initiatives | Difficult to say to what extent "technological implications and opportunities" were considered by education initiatives at that time. The ETAC has periodically served in an advisory capacity for educational technology policy. |
| 2. Partnerships, Alliances, and Public Awareness | The recommendation largely focused on OSPI-based initiatives. OSPI has sponsored multiple educational technology initiatives since 1994. Additionally, Section 5, State of the State, describes current status of multiple initiatives that have directly and indirectly involved OSPI. |
| 3. Affordable Telecommunications Access for Schools | The Legislature supported the development and continued support for the K-20 Network. The K-20 Network and E-rate program significantly address this recommendation. |
| 4. State Policies and Funding Strategies Which Reflect Schools' Technology Requirements | This recommendation was very broad, which makes it difficult to gauge progress. Recommendation 4 states, "It is recommended that all development, adoption and/or revision of policies and procedures for the common school system by the State Legislature, the State Board of Education, the Commission on Student Learning, and OSPI reflect current technological requirements for learning." |
| 5. Levy and Bond Regulations Which Reflect Schools' Technology Requirements | SSB 6515 (2002 c 275) clarifies that capital projects funds may be used by school districts to pay the costs of implementing technology systems, facilities, and projects. Limited primarily to hardware system upgrades, not curriculum, instruction, assessment, or professional development practices. |
| 6. State Allocation to Districts for Technology | Various grant programs have been established through a mix of federal and state sources. No dedicated grant program for educational technology in place. |
| 7. Regional Support for Educational Professionals | $3.9 million provided biennially supports the Educational Technology Support Center Program, the Educational Technology Development Center, and OSPI staff to provide statewide leadership in technology. |
| 8. Enhancing K-12 Education's Statewide Electronic Network | By December 1999, all ESDs, 294 school districts, the schools for the deaf and blind students, and OSPI were connected to the network. Over 98 percent of K-12 classrooms in Washington State now have access to the Internet via the K-20 Network. |
| 9. Providing Electronic Destinations | Multiple program initiatives are underway, directly or indirectly involving OSPI. These include online buying cooperatives, online courses, professional development support, and online databases. See Appendix E, Educational Technology Initiatives. |

| 1994 Technology Plan Recommendation | Current Status |
|---|---|
| 10. Integrating Technology into the Curriculum | No comprehensive state-funded initiative to date. Primarily limited to course development and professional development opportunities provided through a variety of public and private resources. |
| 11. Technology in Teacher Preparation Programs | No comprehensive statewide initiative to date. Multiple public and private initiatives underway for professional development in pre-service and in-service programs. The ETAC has adopted the ISTE National Educational Technology Standards (NETS) framework for teachers. |
| 12. Information Policies | 294 of 296 districts have formulated educational technology plans and have adopted educational technology policies. |

Source: *Report to the Legislature on the Washington State Technology Plan for the K-12 Common School System* (1994). Olympia, WA: Office of Superintendent of Public Instruction.

Other recommendations have been implemented partially or, based on the current state of the state and gap analysis, reflect continuing needs. In particular, although many individual efforts are underway, there have been no comprehensive state-funded and sustained initiatives in support of integrating technology into curriculum (Recommendation 10) and technology into teacher preparation programs (Recommendation 11).

Progress Compared to the 2002 Technology Plan Recommendations

*Table 6.2* provides a summary of the 2002 technology plan recommendations (see Appendix D for the full text summary of each recommendation). Significant progress has been made on several recommendations, including:

- Teacher, Paraprofessional, and Educational Leader Technology Standards (Recommendation 1).
- Student “Technology Literacy” Standards (Recommendation 3).
- Digital Educational Content (Recommendation 9).
- Best Practices in Educational Technology (Recommendation 10).
- Statewide Data-Driven Decision Making System (Recommendation 12).

Minor progress has been noted on three other recommendations from the plan.

*Table 6.2. 2002 Technology Plan Recommendations and Current Status*

| 2002 Recommendation | Current Status |
|---|---|
| ***STANDARDS AND PROFESSIONAL DEVELOPMENT*** | |
| **Teacher, Paraprofessional, and Educational Leader Technology Standards and Professional Development** | 128 of 296 districts have technology standards for teachers, 74 districts have technology standards for paraprofessionals, and 98 districts have technology standards for educational leaders. |
| **Pre-Service Educational Technology Training** | Although progress has been minimal, the Performance-Based Pedagogy Assessment of Teacher Candidates document (June, 2004) includes technology. |
| **Student "Technology Literacy" Standards** | 185 school districts have technology standards for students. |
| ***FISCAL POLICY AND STRATEGIC FUNDING*** | |
| **Flexibility in Bonds and Levies** | No progress. However, a proposal to lower school bonds and levies passage requirement to 50% passed the Senate (but not the House) in 2005. |
| **State Educational Technology Funding/ Revolving Fund** | No progress. |
| **Enhanced Educational Technology Support** | No progress. |
| ***LEARNING AND TEACHING SUPPORT*** | |
| **Enhanced K-20 Educational Telecommunications Network** | No progress. However, 98.7% of public K-12 classrooms now have networked Internet connectivity. |
| **Targeted Support for Needy Schools** | No progress. |
| **Digital Educational Content** | The Digital Learning Commons is promoting online learning opportunities for Washington's students. |
| **Best Practices in Educational Technology** | The Educational Technology Support Center (ETSC) Program is assisting districts with Microsoft Peer Coaching, MarcoPolo resources aligned to state standards, and Metiri "Technology That Works" database. |
| **Community Engagement Through Educational Technology** | No progress. |
| **Statewide Data-Driven Decision Making System** | OSPI has established the Core Student Record System (CSRS) and Electronic Data System (EDS). |

## Progress Compared to Other States

Washington compares favorably to other states on several measures in student access to educational technology and applications, though not as well on others.

The K-20 Educational Telecommunications Network was one of the first statewide network backbones in the country providing access to almost all school districts statewide. The Legislature's continuing support of the network has extended its use beyond K-12 to universities, community and technical colleges, and libraries. As noted previously, today almost all instructional classrooms statewide (98.5 percent) can access the Internet from one or more classroom computers. This compares favorably with many other states.

The *2002 State New Economy Index* (Progressive Policy Institute)[30] measures, among other items, the amount of technology in schools based on:

- Students per multimedia computer.
- Students per Internet connected computer.
- Percentage of schools with Internet access through a T1 or cable modem.
- Percentage of schools where at least 50 percent of teachers use the Internet in class.
- Percentage of schools where at least 50 percent of teachers have school-based email addresses.

Based on this aggregate measure, Washington ranked 27th nationwide. According to the Progressive Policy Institute, states that ranked highest in integrating information technology into schools are the less populated and more geographically dispersed states, perhaps suggesting a need for rural and remote areas to seek higher levels of access and connectivity.

On other measures described in *Technology Counts*, Washington does not compare as favorably on several educational technology measures (Education Week, 2002):

- Washington does not provide any incentives for teachers to use technology (compared with, for instance, Wyoming, which provided 20 days of state-financed training in 2001-02 to more than 600 teachers and 100 administrators to develop standards-based classrooms using technology).
- Washington does not have online testing available for the Washington Assessment of Student Learning or other statewide tests (compared with, for instance, South Dakota's online assessment system).

- Although Washington requires technology training in educational technology for teacher certification, the requirements are broadly defined, are not specific to required knowledge, skills, or abilities (KSAs), and may be highly variable across the schools of education (compared with, for instance, Idaho's teacher performance standards).

Summary of Current Barriers and Issues

Similar to barriers cited in national studies of educational technology, Washington schools encounter barriers such as:[31]

- The lack of equitable and universal access to up-to-date equipment; teachers are reluctant or altogether unwilling to use equipment that is severely limited instructionally, performs unreliably, or requires extensive support to access.
- Inadequate or outdated technology-based instructional materials and online information; districts with poor website design or access may make teachers and students reluctant to use technology at school.
- Shortage of information technology (IT) workers due to funding constraints or private sector competition for highly qualified network administrators at salaries that are higher than what schools can support.
- Buildings not "ready" to use technology and telecommunications.
- Lack of budgeting and funding for support, maintenance and upgrading of equipment.
- Lack of funding for planning, staff development, and curriculum development.
- State fiscal policies that restrict the use of bonds and levies mainly to hardware expenditures.

## *6.5 THE BOTTOM LINE: EDUCATIONAL TECHNOLOGY AND STUDENT ACHIEVEMENT*

Several studies point to the promise and difficulty in gauging the effect of educational technology on student achievement (Ringstaff and Kelley, 2002; Schacter, 1999; Smerdon, et al., 2000; Becker, 2000). Reviews of studies on educational technology highlight the variability in terms of the technology used (and the speed at which it is changing), the population of interest (general classroom environment, teachers, poor students), and the dependent variables or measures of interest.

Measuring the impact of technology use on student achievement is "fraught with difficulties" since classrooms "are not experimental laboratories where scientists can compare the effectiveness of technology to traditional instructional methods while holding all other variables constant" (Ringstaff and Kelley, 2002: 23). Despite this caution, an emerging body of research provides optimism that, when applied appropriately and judiciously, educational technology can improve student achievement for students in general, as well as for those who are at-risk or have special needs.

Conditions that favor desirable educational outcomes acknowledge that technology is not a panacea for difficult decisions and hard work to improve student achievement. Technology is merely “one piece of the puzzle.”

Teachers, in order to use technology effectively, need adequate and appropriate training and they need to hold certain pedagogical beliefs in order to use technology effectively. Educators and their students need sufficient and accessible equipment and the technology needs to be put into the right instructional environment. Students also need to be supported at home in how they use educational technology. Educational leaders need to develop appropriate policies that encourage rather than unnecessarily hinder, block, or filter material that is relevant to a student’s educational goals. To make all this happen, network administrators need to be on hand (i.e., staffed) in order to provide teachers, administrators, and students with sufficient technical and instructional support.

Educational technology is not simply a matter of providing a stand-alone computer laboratory accessible only at a certain time of day. Technology, in order to be effective in raising student achievement, must be integrated within the instructional and curricular framework. It must complement an instructional objective rather than be regarded by teachers and administrators as an unnecessary intrusion into a pre-established curriculum (Ringstaff and Kelley, 2002; Becker, 2000, Smerdon, et al., 2000; Becker, 1999; Schacter, 1999; National School Boards Foundation, 2002; Levin and Arafeh, 2002; Byrom, 1998).

In the following section, the Educational Technology Advisory Committee articulates how the educational technology gaps identified in this report can be addressed.

# *7.0 Recommendations*

This section describes the recommendations developed by the Educational Technology Advisory Committee, which focus on Professional Development to Support Technology Literacy and Integration. The ETAC strongly emphasizes the holistic relationship between these recommendations and the primary outcome of interest, improved student learning.

## *PROFESSIONAL DEVELOPMENT TO SUPPORT TECHNOLOGY LITERACY & INTEGRATION*

Description of New Technology Professional Development Initiative

OSPI should pursue state or federal funding to establish a holistic technology professional development grant program that ensures that technology essential conditions are in place in addition to the professional development program. It is recommended that this program would provide buildings selected for participation with flexible matching funds to establish these essential conditions, followed by funding for intensive peer coaching/mentoring support for a minimum of three years. A rigorous external formative and summative evaluation of the program will be conducted.

The professional development provided should embody these principles of effective technology professional development:

- Involve staff in the development of a long-term school improvement plan constructed from an analysis of school and individual assessment identifying academic strengths and needs, which aligns and integrates technology with the curriculum.
- Allow staff to choose from a range of professional development options that meet their professional needs and delivery preferences, with expectations and incentives clearly defined.
- Model the infusion of technology to create schools as learner-centered environments that foster in students the mastery of concepts and learning strategies that promote the application of understandings to real-world problems.
- Focus on the development of school-based, collaborative learning communities of educators sustained through daily job-embedded practice, ongoing coaching and follow-up.
- Seek to understand and appropriately support the development of rich curriculum-based, technology-infused learning environments.
- Use formative and summative assessment to measure the impact of professional development on both classroom instructional practice and student achievement, and use this data to continuously improve the professional development.

Connections and Potential Leverage with Current or Emerging Initiatives

Two promising programs are already in place which could be leveraged for such a program. The "Peer Coaching Program", part of Microsoft's Partners in Learning initiative, is designed to help schools implement a professional development model that enhances standards-based instruction by supporting teachers to provide engaging, technology rich, learning activities to students. The Program trains teacher leaders to serve as peer coaches for colleagues. As coaches, these teachers assist their peers in identifying ways that technology can strengthen classroom curriculum and enhance their students' academic achievement. They also help their colleagues to develop the necessary technology skills and instructional strategies needed to integrate technology into teaching and learning. In Washington State, the Microsoft Peer Coaching Program is provided primarily through the Educational Technology Support Center Program.

The eMINTS instructional model, initially developed in Missouri**,** is a set of research based strategies grounded in constructivist theory. The model supports educators in integrating technology and best teaching practices to create a learning community where teachers and students explore and create knowledge together using a variety of resources. Teachers facilitate student learning through the use of essential questions that stimulate thinking; build curiosity, create connections, and generate long lasting knowledge through issues that matter to students. The eMINTS instructional model requires conscious alignment of curriculum, professional development initiatives, technology acquisitions and school vision. Collaborative leadership practices and school structures that support the school's professional learning community in the implementation of the eMINTS instructional model are required for success.

Critical elements of the eMINTS instructional model include:

- A carefully selected suite of hardware and software;
- Constructivist, inquiry-based teaching practices;
- Sustained, intensive professional development and classroom visits;
- Implementation by school-based teams; and
- Rigorous external formative and summative evaluation.

Ten Key Strategies to Support Technology Literacy & Integration

In addition to the Technology Professional Development Initiative, the ETAC recommended ten key strategies to support statewide efforts in technology literacy and integration:

**1. Highlight professional development initiatives that are already underway through the state-funded Educational Technology Support Center (ETSC) Program.** Besides the Microsoft Peer Coaching Program, these also include the Sustainable Classroom Model, the SHARE Project, Leadership Institutes in partnership with NCCE, the Teacher Leadership Project (TLP), and training in the use of MarcoPolo resources.

**2. Highlight existing connections to statewide curricular initiatives and make new connections.** In mathematics, these already include the NO LIMIT Project, MarcoPolo resources aligned to state standards, and the Metiri "Technology That Works" database. In reading, this also includes MarcoPolo resources aligned to state standards, and the Metiri "Technology That Works" database. In science and social studies, it includes MarcoPolo resources aligned to state standards, and the opportunity to integrate technology into newly-developed Classroom-Based Assessments. In writing, the ETAC recommends that OSPI explore piloting the use of technology to take the Writing WASL.

**3. Strengthen existing connections to Professional Growth Plans for educators.** The Washington State Professional Development Planning Guide in Action (September, 2005) includes technology as a key element impacting the learning environment, and the ETAC recommends that the newly-developed Tiers of Technology Integration be used as part of this "Needs Assessment Rubric".

**4. Strengthen existing connections to Pre-Service Training of new teachers.** The Performance-Based Pedagogy Assessment of Teacher Candidates document (June, 2004) also includes technology as a key element, and the ETAC recommends that the newly-developed Tiers of Technology Integration be used as part of their "Performance-Based Pedagogy Assessment".

**5. Identify and highlight districts that have required technology competencies for educators or use technology integration as an element of teacher observations by administrators.** For example, Lake Washington School District expects all educators who use computers in the course of their duties to demonstrate proficiency in at least four required software applications.

**6. Identify and highlight districts that have required technology literacy courses for students or have aligned their curriculum to NETS Standards.** For example, Bellingham School District has developed "Technology Connections", a semester-long course designed to equip all 9th grade students with organizational skills and technology tools needed to accomplish high level learning goals. The course works in conjunction with other required freshman classes (e.g., English and Science), and elements of school and career planning are incorporated as well.

**7. Identify and highlight districts that include technological resources as part of their curriculum adoption cycle.** For example, Kent School District includes software and technological tools as part of their "Adopted Materials and Supplemental Support Materials for elementary schools".

**8. Require districts to address Technology Essential Conditions as part of the 2007-2010 school district technology planning process.** In order to receive E-rate or Title II, Part D (EETT) funds, districts are required to have an approved 3-year technology plan, and most districts will be going through the planning process during 2006-07. Because these Essential Conditions are necessary for schools to effectively use technology for learning, teaching, and educational management, the ETAC recommends that these physical, human, financial, and policy dimensions should be assessed and addressed in future 3-year technology plans, beginning with the 2007-2010 cycle. This will help ensure that funding decisions and professional development plans developed to support these plans take into account "the whole picture", and increase the likelihood of success in improving technology integration and technology literacy, and ultimately improving student achievement.

**9. Make connections to the Microsoft Partners in Learning "Learning Transformed" Grant awarded to EWU and Cheney School District.** The ETAC recommends that the newly-developed Tiers of Technology Integration and some of the self-assessment and observation tools being developed should be used as part of evaluation of the grant over time.

**10. Strengthen existing connections to National Board Certification for educators.** A key part of the certification process is the portfolio, in which teachers videotape their teaching, gather student learning products and other teaching artifacts, and provide detailed analyses of their practice. The ETAC recommends that technology should be integrated throughout this process, and best practices shared with new candidates pursuing certification.

# *Endnotes*

[1] Additional information on the ETAC planning process is online at: http://www.k12.wa.us/EdTech/techplan.aspx

[2] This description of the education reform process was adapted in part from the draft Washington State Technology Plan for K-12 Common Schools (November 15, 1993), and the federal ESEA application submitted by OSPI to the U.S. Department of Education June 12, 2002. Retrieved August 26, 2002 from the OSPI website: http://www.k12.wa.us/ESEA/

[3] See, RCW 28A.650.015.

[4] Additional information on ESEA, Washington State's application for ESEA funding, and related links is online at: http://www.k12.wa.us/ESEA/

[5] The ESEA information is derived primarily from *Washington State Consolidated Application For Federal Funds Under the Elementary and Secondary Education Act "No Child Left Behind"* (OSPI, 2002). The application is online at: http://www.k12.wa.us/ESEA/

[6] With the passage of the ESEA, in federal fiscal year 2003 the Technology Literacy Challenge Fund (TLCF) is consolidated with several other technology programs under *Title II, Part D—Enhancing Education Through Technology.* The TLCF provided funds to obtain computer equipment, Internet connections, content, and staff training.

[7] Please see Appendix B, Bibliography, for additional information on these conceptual frameworks.

[8] The Six Essential Conditions for the Effective use of Technology in Learning are: 1) Vision; 2) Practice; 3) Proficiency; 4) Equity; 5) Access; 6) Systems. Retrieved September 16, 2002 from the North Central Regional Educational Laboratory website: http://www.ncrel.org/engauge/framewk/index.htm

[9] "The STaR Chart identifies and defines four school profiles ranging from the "Early Tech" school with little or no technology to the "Target Tech" school that provides a model for the integration and innovative use of education technology. The STaR Chart is not intended to be a measure of any particular school's technology and readiness, but rather to serve a benchmark against which every school can assess and track its own progress." Retrieved September 16, 2002 from the International Society for Technology in Education website: http://ww2.iste.org/starchart/

[10] Retrieved September 16, 2002 from the OSPI website: http://www.k12.wa.us/SchoolImprovement/success.aspx

[11] **RCW 28A.150.210**
**Basic Education Act -- Goal.**
The goal of the Basic Education Act for the schools of the state of Washington set forth in this chapter shall be to provide students with the opportunity to become responsible citizens, to contribute to their own economic well-being and to that of their families and communities, and to enjoy productive and satisfying lives. To these ends, the goals of each school district, with the involvement of parents and community members, shall be to provide opportunities for all students to develop the knowledge and skills essential to:

> (1) Read with comprehension, write with skill, and communicate effectively and responsibly in a variety of ways and settings;

(2) Know and apply the core concepts and principles of mathematics; social, physical, and life sciences; civics and history; geography; arts; and health and fitness;

(3) Think analytically, logically, and creatively, and to integrate experience and knowledge to form reasoned judgments and solve problems; and

(4) Understand the importance of work and how performance, effort, and decisions directly affect future career and educational opportunities.

[1993 c 336 § 101; (1992 c 141 § 501 repealed by 1993 c 336 § 1203); 1977 ex.s. c 359 § 2. Formerly RCW 28A.58.752.]

[12] See also Becker (1999): 22. In the review of Internet use by teachers, Becker sought to examine teacher attitudes about what constitutes good teaching and how that relates to Internet use. His survey analysis distinguished several factors related to constructivist versus traditional pedagogy, including disagreement with traditional pedagogy and learning theory, frequent use of projects and demonstrations, and frequent practices requiring heavier student responsibility.

[13]The Metiri Group (n.d.). "Range of Use." Retrieved August 12, 2002 from The Metiri Group website: http://www.metiri.com/WebInvestigation/RangeOfUse.htm

[14] State Educational Technology Directors Association (SETDA), "2002 National Leadership InstituteToolkit." Retrieved December 21, 2005 from the SETDA website: http://www.setda.org/NLItoolkit/tla/tla02.htm

[15] Washington State Technology Plan for K-12 Common Schools (1994), "Seven Essential Learnings for Technology." Retrieved December 21, 2005 from the OSPI website: http://www.k12.wa.us/EdTech/p11-22.aspx

[16] Washington State Educational Technology Plan (2002), "Technology Foundation Standards for Students." Retrieved December 21, 2005 from the OSPI website: http://www.k12.wa.us/EdTech/TechfoundationStudents.aspx

[17] International Society for Technology in Education (ISTE), "National Educational Technology Standards (NETS) for Students". Retrieved December 21, 2005 from the ISTE website: http://cnets.iste.org/students/

[18] Partnership for 21st Century Skills, "Learning for the 21st Century." Retrieved December 21, 2005 from the website: http://www.21stcenturyskills.org/

[19] Information and Communication Technologies (ICT) Panel, "Digital Transformation: A Framework for ICT Literacy." Retrieved December 21, 2005 from the Educational Testing Service website: http://www.ets.org/Media/Tests/Information_and_Communication_Technology_Literacy/ictreport.pdf

[20] National Resource Council, "Being Fluent with Information Technology." Retrieved December 21, 2005 from the NRC website: http://stills.nap.edu/html/beingfluent/es.html

[21] Northwest Educational Technology Consortium (NETC), "Overview of Technology Integration." Retrieved December 21, 2005 from the NETC website: http://www.netc.org/images/pdf/tech.integration.pdf

[22] Ibid

[23] Ibid

[24] Fouts & Associates, "Classroom Instruction in Gates Grantee Schools: A Baseline Report." Retrieved December 21, 2005 from the Gates Foundation website: http://gatesfoundation.org/nr/downloads/ed/researchevaluation/ClassroomInstruction.pdf

[25] International Society for Technology in Education, "Essential Conditions for Implementing NETS for Administrators." Retrieved December 21, 2005 from the ISTE website: http://cnets.iste.org/administrators/a_esscond.html

[26] Nebraska Department of Education, "Rubric Of Essential Technology Conditions (RETC) for Nebraska PreK-12 Schools." Retrieved December 21, 2005 from the Nebraska DOE website: http://www.nde.state.ne.us/TECHCEN/documents/NERETC.pdf

[27] Becker, H., 1999: 3. Becker's qualification brings up an important point, namely, that merely measuring the ratio of computers to students in a building does not provide the finer grain detail of how appropriately and effectively computers are deployed within a building.

[28] "In 1996, a third of 4th graders and about a quarter of 8th graders reported that they used computers at least once or twice a week. Four years later, the reported levels of use were unchanged" (Education Week, 2002: 56).

[29] The Technology Support Index was developed by Dr. Chip Kimball in conjunction with ISTE and the Bill & Melinda Gates Foundation. Retrieved September 6, 2002 from the ISTE website: http://tsi.iste.org/techsupport/

[30] Retrieved August 30, 2002 from the Progressive Policy Institute website: http://www.neweconomyindex.org/states/2002/endnotes.html#23

[31] "Funding, Maintenance, and Hardware: Dilemmas and Some Proposed Solutions for Washington State Schools." Unpublished document from the Technology Alliance.

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# *APPENDIX A*
# *EDUCATIONAL TECHNOLOGY ADVISORY COMMITTEE (ETAC) MEMBERS AND ETAC WORKING GROUP PARTICIPANTS*[1]

## ETAC MEMBERS

### CHAIR:

*Dr. Terry Bergeson, Superintendent of Public Instruction*

### MEMBERS REPRESENTING:

Business/Industry

*Jane Broom, Partners in Learning Initiative, Microsoft*
*Rick Meeder, Communications Manager, Intel Washington Public Affairs*

Commission on Student Learning[2]

*Mickey Lahmann, Assistant Superintendent, Curriculum and Instruction, OSPI*

Department of Information Services

*Gary Robinson, Director, DIS*
*Connie Michener, Executive Director, K-20 Program Office*

Digital Learning Commons

*Judy Margrath-Huge, President and CEO, DLC*

Educational Service Districts

*Jon Nelson, Associate Superintendent, ESD 112*

Educational Technology Support Centers

*Anne Allen, Educational Technology Development Center Director*
*Forrest Fisher, ETSC Director, ESD 105*
*Conn McQuinn, ETSC Director, Puget Sound ESD*

Governor's Office

*Dana Richardson, Executive Policy Advisor*

Higher Education Coordinating Board

*Andi Smith, Academic Policy Analyst, HECB*

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[1] Additional information on the ETAC planning process is online at: http://www.k12.wa.us/edtech/techplan.aspx

[2] The ETAC enabling legislation (RCW 28A.650.015) required a representative from the Commission on Student Learning (CSL). However, the CSL expired on June 30, 1999. OSPI appointed Mickey Lahmann to remain in this role as a logical successor to the CSL.

Higher Education Faculty

*Anthony Jongejan, Instructional Technology, Woodring College of Education, WWU*

Northwest Council for Computers in Education

*Rick Williams, Foothills Middle School, Wenatchee SD*

Parents

*Jean Carpenter, Executive Director, Washington State PTA*

Principals

*Robert McMullen, Director of High School Programs, Association of Washington School Principals*

Regional Institutional Technical Units

*Jack Morris, Technology Administrator, ESD 123*

School Directors

*Kevin Laverty, School Board Member, Mukilteo SD*

School District Technology Directors

*Chuck Wahle, Ellensburg SD*

Scientists and Mathematicians

*Robert McIntosh, Mathematics Program Specialist, North Thurston SD*

State Board of Community and Technical Colleges

*Mike Scroggins, Assistant Director*

State Board of Education

*Gustavo (Gus) Ramos, Pasco High School, Pasco SD, Student Representative*

State House of Representatives

*Rep. Glenn Anderson, 5th Legislative District*

Technology Access Foundation

*Trish Millines Dziko, Chair of Advocacy Committee, TAF*

Technology Alliance

*Bryan Chee, Director for Education and Technology*

Washington Education Association (WEA)/Teachers

*Tammy Alonzo, Southworth Elementary School, Yelm Community Schools*
*Duane Duxbury, Curriculum and Assessment Specialist, Franklin Pierce SD*
*Laura Ferguson, Enumclaw Middle School, Enumclaw SD*
*Laura Sanders, Westwood Elementary School, Enumclaw SD*

Washington School Information Processing Cooperative

*Jeff Conklin, Executive Director, WSIPC*

Washington State Library (Office of the Secretary of State)

*Gary Bortel, IT Services Manager, Library Development, WSL*

Workforce Training and Education Coordinating Board

*Wes Pruitt, Legislative Liaison/K-12 Policy Analyst, WTECB*

Office of Superintendent of Public Instruction (OSPI) Staff

*Marty Daybell, CIO/Deputy Superintendent*
*Anne Banks, Curriculum Specialist*
*Julia Fallon, Program Developer for Technical Education*
*Leslie Goldstein, Assistant Superintendent, Governmental Affairs*
*Kyra Kester, Special Assistant to the Superintendent*
*Dennis Small, Educational Technology Program Manager*
*James L. Smith, Enhancing Education Through Technology Program Manager*
*David Walddon, K-20 Program Manager*

# ETAC WORKING GROUPS PARTICIPANTS

## Technology Literacy for Students Working Group

*Dick Barnhart, ESD 113*
*Johna Berg, East Valley SD (Spokane)*
*John Cohen, Steilacoom SD*
*Julia Fallon, OSPI*
*Forrest Fisher, ESD 105*
*Kyra Kester, OSPI*
*Kim Mathey, Edmonds SD*
*Conn McQuinn, Puget Sound ESD*
*Connie Michener, K-20 Program Office*
*Diana Patitucci, ESD 123*
*Wes Pruitt, Workforce Training and Education Coordinating Board*
*Dennis Small, OSPI*
*James Smith, OSPI*
*David Walddon, OSPI*
*Lorie Whitaker, Tukwila SD*
*Greg Whiteman, Tacoma SD*
*Rick Williams, Wenatchee SD*
*Jennifer Wright, Mercer Island SD*

## Technology Integration into the Curriculum Working Group

*Anne Banks, OSPI*
*Dick Barnhart, ESD 113*
*Johna Berg, East Valley SD (Spokane)*
*Wes Burmark, Tacoma SD*
*Mike Cullum, Northshore SD*
*Trish Millines Dziko, Technology Access Foundation*
*Duane Duxbury, Franklin Pierce SD*
*Laura Ferguson, Enumclaw SD*
*Becky Firth, Northwest ESD 189*
*Tony Jongejan, WWU*
*Judy Margrath-Huge, Digital Learning Commons*
*Kim Mathey, Edmonds SD*
*Bob McIntosh, North Thurston SD*
*Rick Meeder, Intel*
*Connie Michener, K-20 Program Office*
*Jack Morris, ESD 123*
*Traci Pierce, Lake Washington SD*
*Cari Roderick, East Valley SD (Spokane)*
*Dennis Small, OSPI*
*David Walddon, OSPI*
*Lorie Whitaker, Tukwila SD*
*Jennifer Wright, Mercer Island SD*

## Essential Conditions Working Group

*Anne Allen, Puget Sound ESD*
*Dick Barnhart, ESD 113*
*Becky Firth, Northwest ESD 189*
*Forrest Fisher, ESD 105*
*Conn McQuinn, Puget Sound ESD*
*Deb Ramsay, ESD 101*
*Dennis Small, OSPI*
*Debbie Tschirgi, ESD 112*

| ***Program Name*** | ***Sponsor*** | ***Internet Address*** | ***Services and Activities*** | ***Description*** |
|---|---|---|---|---|
| *Christa McAuliffe Academy* | Christa McAuliffe Academy | http://www.cmacademy.org/ | School online courses | CMA is an accredited private academy, granting a high school diploma to graduates of the web-based learning program. |
| *Digital Learning Commons* | *Digital Learning Commons* | http://www.learningcommons.org | Online courses, digital resource library, college and career planning materials, instructional support tools, and digital tools. | The Digital Learning Commons (DLC) is a nonprofit organization established to improve access to educational opportunities and learning resources by providing high-quality educational materials, online courses, and technology tools for Washington's students, teachers, and parents. After successfully completing its proof-of-concept phase, which served 65 schools and more than 35,000 users over the course of two years, the DLC is now in the implementation phase. |
| *Evergreen Internet Academy (Vancouver )* | Evergreen School District | http://eia.egreen.wednet.edu/ | School online courses | The Evergreen Internet Academy offers a web-based education to all students grades six through twelve. The EIA provides an online public school program, online courses taught by certified teachers, a high school diploma program, and full-time enrollment. |
| *Education Technology Support Centers* | Washington State | http://www.edtech.wednet.edu/ | Support OSPI-directed technology initiatives, collaboration, professional development, information dissemination, support regional technology leadership & district technology planning. | At all nine Educational Service Districts (ESDs), Educational Technology Support Centers (ETSCs) are state-funded in support of Education Reform, Chapter 28A.650 RCW to: improve technology infrastructure; monitor and report on school district technology development; promote standards for school district technology; promote statewide coordination and planning for technology development; and provide regional educational technology support centers, including state support activities. |
| *Federal Way Internet Academy* | Federal Way School District | http://www.iacademy.org | School online courses | The Internet Academy provides learning opportunities that include: online core courses (K-12) that support state standards; Washington State certificated teachers; flexible learning schedules; technical assistance for Internet Academy course; online gradebook and progress reporting. |

| ***Program Name*** | ***Sponsor*** | ***Internet Address*** | ***Services and Activities*** | ***Description*** |
|---|---|---|---|---|
| *GenYES* | Generation YES | http://www.genyes.org/ | Online curriculum, projects, feedback, and expertise | The foundation for Generation YES is the extensive involvement of students as collaborative partners with their teachers, their school, their school district, and the local community to assist in restructuring education through instructional and telecommunications technologies. Generation YES originated in 1996 in the Olympia School District as a U.S. Department of Education Technology Innovation Challenge Grant (TICG). During the five year grant cycle, 151 Washington State schools used the model. |
| *High Tech Learning Centers* | Northeast Vocational Area Cooperative (NEVAC) | http://www.nevac.org/ | Information technology (IT) education for high school students | Located in each of the nine NEVAC school districts, the High Tech Learning Centers (HTLCs) deliver state-of-the-art Information Technology (IT) education to high school students that leads to industry certification and/or accelerated placement in higher education, creating a skilled IT workforce in the most productive way. Over 10,000 students have taken HTLCs classes and many more are registered to take advantage of the wide variety of high tech class offerings in the areas of Programming, Networking, Animation, Web Authoring, and Multimedia. |
| *Internet 2 (Abilene)* | Multiple sponsors, including University of Washington | http://www.internet2.edu/abilene | Internet applications | Advanced backbone network that supports the development and deployment of new Internet applications being developed within the Internet2 community. |
| *K-20 Network* | Washington State Department of Information Services | http://www.dis.wa.gov/enterprise/k20network/index.aspx | High-speed telecommunications network | The K-20 Educational Telecommunications Network is a high-speed telecommunications backbone that enables the use of the Internet and live two-way videoconferencing in all of Washington's public education sectors, and also connects the schools and sectors with one another. The network now connects 475 public education sites throughout the state including campuses of community and technical colleges, regional universities, research institutions, independent colleges, public libraries, and the K-12 school districts and educational service districts. |

| ***Program Name*** | ***Sponsor*** | ***Internet Address*** | ***Services and Activities*** | ***Description*** |
|---|---|---|---|---|
| *Technology & Learning Disabilities Project* | Enhancing Education Through Technology competitive grants | http://www.cwu.edu/~setc/tld/ | Special needs: Learning disability educational technology assistance | This Title II, Part D, competitive grant project works with 6th through 12th grade special education teachers to help improve teaching practices in reading, writing, and mathematics using assistive technologies. The project is directed by the Special Education Technology Center (SETC) at Central Washington University. |
| *MarcoPolo* | Worldcom Foundation | http://www.marcopolo.wednet.edu | School online content | MarcoPolo provides no-cost, standards-based Internet content for K-12 teachers and students, developed by content experts. Resources include panel-reviewed links to top sites in many disciplines, lesson plans, classroom activities, materials to help with classroom planning, and search engines. |
| *NO LIMIT Project (New Outcomes: Learning Improvement in Mathematics Integrating Technology)* | Enhancing Education Through Technology competitive grants | http://www.k12.wa.us/edtech/eett.aspx | Math skills achievement | The NO LIMIT (New Outcomes: Learning Improvement in Mathematics Integrating Technology) Project is funded through the Enhancing Education Through Technology federal grant program. Teams of middle school teachers strive to improve teaching practices in mathematics through the integration of technology and other research-based methodologies. |
| *NovaNet* | ETSC | http://www.pearsondigital.com/novanet | School online courses | For grades 6-12, NovaNET offers online delivery of interactive curriculum. Schools can use this fee-based service at reduced rates through the ETSC. |
| *Preapre to Integrate Learning with Technology (PILOT) Tool* | ETSC | http://www.edtech.wednet.edu/pilot | Professional development, assessment, information sharing | The site serves many purposes: It is an online, self-assessment tool for educators to determine their levels of technology proficiency and classroom application. Based upon the results of the assessment, it is a place for educators to view and select learning opportunities throughout the state to advance their proficiency level. It is also a tool for districts to use with their staff to plan their professional development efforts. |
| *ProQuest* | ProQuest | http://www.il.proquest.com/proquest | Online news and archival subscription service | Schools can subscribe to ProQuest to facilitate online research by students and faculty. |

| *Program Name* | *Sponsor* | *Internet Address* | *Services and Activities* | *Description* |
|---|---|---|---|---|
| *SHARE Project (The Student Hub of Academic Resource Exchange)* | ETSC | http://share.esd105.wednet.edu | Online curriculum, projects, feedback, and expertise; classroom web page development and enhancements; student resources; Connections 2 curriculum development tool | SHARE is a project involving 85 school districts around the state, 1100+ teachers, 15,000+ students. Each classroom educator is involved in: web-based communication with parents/guardians/students through a classroom Web site, calendar, newsletter and syllabus; guided online student research; online collaborations with educators, the creation, development and publication of student-researched projects, developing and sharing project-based curriculum online; and facilitating structured student feedback on other student projects. |
| *Shared Reading Video Outreach Project (SRVOP)* | ESDs and school districts | http://www.srvop.org/ | Special needs: Deaf child reading enhancement program | During the 2001-2002 school year, more than 150 deaf children between the ages of two and ten years old learned to read a series of popular children's books. Training originates at Puget Sound Educational Service District. |
| *Teacher Leadership Project (TLP)* | | http://www.esd189.org/tlp/about.html | Educational technology professional development for teachers | This grant program was funded by the Gates Learning Foundation, and provided classroom teachers with an opportunity to learn how to integrate technology into the curriculum in their classrooms. The training modules are designed specifically for teachers in the following areas: language arts, social studies, science, and math. Northwest ESD 189 is working on making these modules available online for educators throughout the state. |
| *Networked Learning Communities Project* | Enhancing Education Through Technology competitive grant | http://www.k12.wa.us/edtech/eett.aspx | Online curriculum and student resources | This Title II, Part D, competitive grant project works with teams of teachers in grades 5-9 to improve teaching practices in mathematics using technological tools and other research-based methodologies. Much of the instruction and professional development is delivered online, after initial face-to-face meetings. |
| *Washington State LASER (Leadership and Assistance for Science Education Reform)* | National Science Resources Center (NSRC); regional consortium members | http://www.wastatelaser.org/ | K-8 science education reform: implementation conferences and strategic planning; science education curriculum, instruction, assessment support. | Washington State Leadership and Assistance for Science Education Reform (LASER) is a K-8 science education reform initiative designed to increase the numbers of Washington students participating in quality science education programs. Working collaboratively with more than 80 school districts across the state, Washington LASER is helping these districts initiate, implement and sustain inquiry-centered science education programs. |

| ***Program Name*** | ***Sponsor*** | ***Internet Address*** | ***Services and Activities*** | ***Description*** |
|---|---|---|---|---|
| *WebEd* | ETSC | http://www.webed.com | Professional development re-certification and graduate credit courses for K-12 teachers and administrators | Provides professional development re-certification and graduate credit courses for K-12 teachers and administrators. Schools can use this fee-based service at reduced rates through the ETSC. |

| *Organization* | *Acronym/ Abbreviation* | *Internet* | *Services and Activities* | *Description* |
|---|---|---|---|---|
| Association for Supervision and Curriculum Development | ASCD | http://www.ascd.org/trainingopportunities/ossd/planning.html | Professional development, technical assistance | International, nonprofit, nonpartisan association of professional educators. Provides a forum on education issues and professionalism, shares research, news, and information, and partners with other organizations. |
| Bill & Melinda Gates Foundation | | http://www.gatesfoundation.org/education/default.htm | School grants, scholarships, programs, resources and research evaluation | Sponsor of multiple educational technology initiatives and programs, e.g., Teacher Leadership Project and Smart Tools Academy. |
| Catalyst | Catalyst | http://catalyst.washington.edu/home.html | Profiles, teaching tools, actions plans, how-to, workshops, clinics, web tools | The Catalyst Web site provides tools, resources, and support to teachers with new technologies. Interactive website provides profiles, teaching tools, action plans, how-to instructions, workshops and clinics, and web tools. |
| Center for Applied Research in Educational Technology | CARET | http://caret-iste.org | Supporting educational technology research clearinghouse. | CARET is a project of the ISTE in collaboration with Education Support Systems and the Sacramento County Office of Education. CARET is funded with a grant from the Bill & Melinda Gates Foundation. |
| Center for Digital Government | | http://www.centerdigitalgov.com | Educational technology news resource, grant funding, technology innovations | "The Center for Digital Government is a national research and advisory institute providing government and industry leaders with decision support, research and education services to help them effectively incorporate new technologies in the 21st century." |
| Center for Research on Information Technology and Organizations | CRITO | http://www.crito.uci.edu/tlc/html/tlc_home.html | Educational technology research, technology adoption | The Center for Research on Information Technology an Organizations (CRITO) is a multidisciplinary research unit at the University of California, Irvine. CRITO conducts theoretical and empirical research related to information management technology in organizations. Educational technology reports include school investment, technology leadership, network support, and Internet use by teachers. |

| ***Organization*** | ***Acronym/ Abbreviation*** | ***Internet*** | ***Services and Activities*** | ***Description*** |
|---|---|---|---|---|
| Consortium for School Networking | CoSN | http://www.cosn.org/ | Total Cost of Ownership (TCO), a planning tool to assess costs associated with technology in schools. | The Consortium for School Networking, a national nonprofit organization, promotes the use of telecommunications and the Internet in K-12 education to improve learning. |
| Disabilities, Opportunities, Internetworking, and Technology | DO-IT | http://www.washington.edu/doit/ | Assistive technology resources for students with disabilities | DO-IT provides programs, resources, publications and videotapes to assist people with disabilities. |
| Education Week | | http://www.edweek.org | News | Provides articles and special reports on education technology. The *Technology Counts* survey provides an annual review of educational technology and related issues. |
| Educational Technology Support Centers | ETSC | http://www.edtech.wednet.edu | Technology infrastructure, school district technology development, school district technology standards, statewide coordination and planning for technology development, regional educational technology support centers, professional development | Created in support of Education Reform, Chapter 28A.560 RCW, ETSCs are housed within each of the nine Washington Educational Service Districts and provide educational technology support to Washington's school districts. |
| eSchool Newsonline | | http://www.eschoolnews.org | News | Provides articles and special reports on education technology. |
| Institute for the Advancement of Emerging Technologies in Education | IAETE | http://www.iaete.org/index.cfm | Educational technology--emergent technology | "Our mission is to promote the purposeful use of new and emerging technologies to improve teaching, learning, and school management." |

| *Organization* | *Acronym/ Abbreviation* | *Internet* | *Services and Activities* | *Description* |
|---|---|---|---|---|
| Intel Teach to the Future | INTEL | http://www.intel.com/education/teach/index.htm | Training resources to help teachers integrate technology into their classrooms to enhance student learning | Major goals: improve science and math in primary and secondary education; increase the effective use of technology in classroom teaching, broaden access to technology, increase the number of people, especially women and minorities, pursuing technical careers. |
| International Society for Technology in Education | ISTE | http://www.iste.org | National Educational Technology Standards (NETS) project. Center for Applied Research in Educational Technology (CARET). Publications. Standard setting. Research projects. | Nonprofit organization developing educational technology standards, research, and supporting services. |
| International Technology Education Association | ITEA | http://www.iteawww.org | Publications, journals, resources, professional development | ITEA is "the largest professional educational association, principal voice, and information clearinghouse devoted to enhancing technology education through experiences in our schools (K-12). Its membership encompasses individuals and institutions throughout the world with the primary membership in North America." |
| The Journal of Technology, Learning, and Assessment | JTLA | http://www.bc.edu/research/intasc/jtla.html | Peer-reviewed, scholarly online journal | The Journal of Technology, Learning and Assessment (JTLA) is a peer-reviewed, scholarly on line journal. The JTLA was established in response to a growing interest in the intersection of computer-based technology, learning, and assessment. The JTLA provides an interdisciplinary forum where initiatives that combine technology, learning theory, and assessment are shared |
| Milken Family Foundation | MFF | http://www.mff.org/edtech/ | Educational technology research. Includes work by J. Schacter, Cheryl Lemke (7 dimensions report), and others. | Nonprofit organization developing educational technology research. |

| *Organization* | *Acronym/ Abbreviation* | *Internet* | *Services and Activities* | *Description* |
|---|---|---|---|---|
| National Research Council | NRC | http://www.nap.edu | Information technology literacy; national research | Federal research agency. |
| North Central Regional Educational Laboratory | NCREL | http://www.ncrel.org/tech/ | State educational technology policy, planning, professional development, research, standards, and partnerships | NCREL provides research-based expertise, resources, assistance, and professional development opportunities for teachers, administrators, and policymakers. NCREL developed the enGauge framework. Also operates the North Central Regional Technology in Education (NCRTEC). |
| Northeast and the Islands Regional Technology in Education Consortium | NEIRTEC | http://www.neirtec.org | State technology planning chart. Professional development articles. Related technology planning assistance. | NEIRTEC focuses on helping educational leaders at the state, district, and school levels put technology to effective use in schools. NEIRTEC places a particular emphasis on the needs of schools in underserved urban and rural communities. |
| Northwest Educational Technology Consortium (NETC) | NETC | http://www.netc.org | Professional development, technical assistance | "Provide professional development opportunities, access to technical assistance, and support for collegial interaction that allow and encourage educators throughout our region, especially in K-12 schools, to become informed and fearless users of technology." Part of the Northwest Regional Educational Laboratory (NWREL). |
| Office of Superintendent of Public Instruction | OSPI | http://www.k12.wa.us/EdTech/techplan.aspx | State education agency responsible for state educational technology planning process. | Washington State education agency. |
| Software and Information Industry Association | SIIA | http://www.siia.net | Software industry association. | Provides state by state comparison of educational technology initiatives. See, *Software and Information Industry Association State Technology Initiatives Report*. See also, SIF specifications report. |

| *Organization* | *Acronym/ Abbreviation* | *Internet* | *Services and Activities* | *Description* |
|---|---|---|---|---|
| Southern Regional Education Board | SREB | http://www.sreb.org/programs/EdTech/pubs/pubsindex.asp | Publications, journals, resources, professional development | A regional cooperative with various educational technology publications. Like other regional cooperatives, focus is on in-region developments. However, provides another perspective on regional developments and issues. |
| Technology Alliance | | http://www.technology-alliance.com | Washington State Technology Survey. Educational technology technical assistance. Supporting research. | Consortium of technology businesses, research institutions, and high-tech grade associations in Washington State. |
| Technology Information Center for Administrative Leadership | TICAL | http://www.portical.org | Administrative leadership resources with an emphasis on educational technology resources | Web site provides a variety of resources for school educational leaders seeking resources and support in educational technology. |
| Texas Education Agency | TEA | http://www.tea.state.tx.us/technology/etac | State education agency responsible for state educational technology planning process. | Texas state education agency. |
| The CEO Forum on Education and Technology | CEO Forum | http://www.ceoforum.org/ | Educational technology policy, integration and assistance | The CEO Forum was a five-year project (finished in 2001) designed to help ensure that American schools effectively prepare students "to be contributing citizens and productive workers in the 21st Century." The CEO Forum sponsored the development of the STaR charts and reports. |
| U.S. Department of Education | DOE | http://nces.ed.gov/pubsearch/index.asp | Federal education agency responsible for national educational technology policy and supporting research. | Federal education agency. |

| *Organization* | *Acronym/ Abbreviation* | *Internet* | *Services and Activities* | *Description* |
|---|---|---|---|---|
| United States Open e-learning Consortium | USOeC | http://www.ctlt.org/projects/us_open_e_learning/exec_summ.php | Deployment of statewide, interoperable, e-learning and decisions-support platforms | The US Open e-Learning Consortium was created to accelerate the deployment of statewide, interoperable, e-learning and decision-support platforms by documenting consensus among a critical mass of states for a common high-level design and aligning state and national resources around that design. The USOeC launched during the 2001-02 school year with an exploratory grant from USED to establish the Consortium, document the consensus design, and pilot a state-to-state (S2S) exchange of test items released from state tests for use in low-stakes, online, instructional/diagnostic assessments. Fourteen states participated in the first phase of this project (AZ, CO, CT, HI, IA, IN, MA, ME, MI, MN, NY, OR, SC, and WA). |
| Washington Assistive Technology Alliance | WATA | http://www.wata.org | Information and referral, consultation and training related to selection of AT devices, services and funding, legal advice and advocacy, policy, technical, publication, and online resource services | Consumer advocacy network that includes the University of Washington Center for Technology and Disability Studies and other organizations. |
| WestEd Regional Technology in Education Consortium (RTEC) | WestEd RTEC | http://www.westedrtec.org | Four focus areas: 1. Getting Connected; 2. Connecting to Best Practices. 3. Connecting to Leadership. 4. Connecting to Tomorrow. See website for additional details. | WestEd RTEC primarily serves to improve technology related resources for the public schools that are annually identified by each state as "low performing" in Arizona, California, Nevada, and Utah. |

| *Title* | *Author(s)* | *Date* | *Organization* | *Document Type* | *Internet Address* | *Keywords* | *Target Audience/ Issue Arena* | *Abstract* |
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| *Technology and Learning with Technology* | Alberta Regional Consortia | | Alberta Regional Consortia | Tool--professional development | http://www.tlt.ab.ca/projects/projects.html | Professional development. Teaching tools | Professional Development | Teaching and Learning with Technology provides professional development for Alberta educators, a process for addressing the Information and Communication (ICT) Outcomes, and a web site with hundreds of technology examples integrated into curriculum-based projects with other relevant links. |
| *ASCD Professional Development Survey* | ASCD | 2002 | ASCD | Tool--professional development | http://www.ascd.org/trainingopporunities/ossd/survey.cfm | Professional Development Survey | Professional Development | Survey designed to help educators design a professional development program for their school or district. The survey automatically tabulates results and makes recommendations for professional development planning. |
| *Investigating Children's Emerging Digital Literacies* | Ba, H., Tally, W., and Tsikalas, K. | 2002 | Journal of Technology, Learning, and Assessment, 1 (1). | Article | http://www.bc.edu/research/intasc/jtla/journal/pdf/v1n4_jtla.pdf | Research | Research | Abstract: Departing from the view that the digital divide is a technical issue, the EDC Center for Children and Technology (CCT) and Computers for Youth (CFY) have completed a 1-year comparative study of children's use of computers in low- and middle-income homes. To assess emerging digital literacy skills at home, we define digital literacy as a set of habits through which children use computer technology for learning, work, socializing, and fun. [See article for complete text of abstract.] |
| *Findings from the Teaching, Learning, and Computing Survey: Is Larry Cuban Right?* | Becker, H. | 2000 | Education Policy Analysis Archives, 8 (51). | Article | http://epaa.asu.edu/epaa/v8n51 | Research | Research | Study finds that only a small and distinct minority of teachers use computers with students but certain conditions make a big difference in the likelihood of this to happen: at least 5 computers in the classroom with one computer per four students. Teachers must have at least average levels of technical expertise and comfort and adopt a constructivist teaching philosophy. Class scheduling and curriculum content requirements also influencing factors. |
| *Appendix B Figures For: "Internet Use by Teachers" Conditions of Professional Use and Teacher-Directed Student Use* | Becker, H. | 1999 | Center for Research on Information Technology and Organizations | Report | http://www.crito.uci.edu/TLC/findings/Internet-Use/index.htm | Research--Evaluation | Research | Analytical review of internet use by teachers. Includes snapshot contrasting teaching philosophies (constructivist versus traditional) among teachers. Appendix B provides comprehensive list of figures related to Internet access and electronic mail use. |
| *Internet Use by Teachers: Conditions of Professional Use and Teacher-Directed Student Use* | Becker, H. | 1999 | Center for Research on Information Technology and Organizations | Report | http://www.crito.uci.edu/TLC/findings/Internet-Use/startpage.htm | Research--Evaluation | Research | Analytical review of Internet use by teachers. Includes snapshot contrasting teaching philosophies (constructivist versus traditional) among teachers. |
| *(Bellingham) Long-Term Funding Strategy* | Bellingham School District | 2001 | Bellingham School District | Strategic Plan | | Funding models | Funding | School district example of educational technology funding strategy. Discusses initial purchase, ongoing maintenance and support, computer replacement schedule, enhanced level of access, and staff development. |
| *Inexorable and Inevitable: The Continuing Story of Technology and Assessment* | Bennett, R. | 2002 | Journal of Technology, Learning, and Assessment, 1 (1). | Article | http://www.jtla.org | Student assessment | Policy Makers | Paper argues that the "inexorable advance of technology will force fundamental changes in the format and content of assessment." As technology becomes more central to schooling, assessing students in a medium different from the one in which they typically learn will become increasingly untenable. Reviews how other states are using new assessment strategies. |
| *White Paper: 21st Century Literacy in a Convergent Media World* | Bertelsmann Foundation | 2002 | Bertelsmann Foundation | Report | http://www.21stcenturyliteracy.org/overview/index.htm | Research -- technology literacy | Key Concepts | "Society in the 21st Century is undergoing rapid changes as it shifts from industrial models to a "knowledge-based society." In order for the broadest segment of the population to take full advantage of this transition, it is critical to develop and promote a new "21st Century Literacy." New technologies have already become an integral part of everyday life. They have also transformed many aspects of how we learn and interact, especially in Education, Workplace, Public policy." Provides research related to technology use and applications in these sectors. |
| *Organization and Financing of Washington Public Schools* | Bigelow, M., Jones, A., and Stead, R. | 2002 | OSPI | Report | http://www.k12.wa.us/safs/PUB/ORG/02/OrgFin02.pdf | Fiscal policy | Policy Makers | Describes Washington State K-12 fiscal and organizational structure. |
| *Teacher Leadership Project 2001 Evaluation Report* | Brown, C., Fouts, J., and Rojan, A. | 2001 | Fouts and Associates | Report | | Research--Evaluation | School Educational Leaders | The Teacher Leadership Project, funded by the Bill and Melinda Gates Foundation, is a program developed to assist teachers to integrate technology into the school curriculum. The program also encourages and facilitates teachers in assuming leadership roles to help schools and districts develop and implement technology plans. The report evaluates the TLP project based on several data sources. |
| *Hard Lessons: After a Decade of Having Computers in School, We've Learned a Lot About What Works--and What Doesn't* | Bulkeley, W. | 1997 | Wall Street Journal | Article | http://www.wsj.com | Commentary and critique | Key Concepts | Commentary on what works and does not work in educational technology policy and practice. |
| *Working Together: People with Disabilities and Computer Technology* | Burgstahler, S. | | Disabilities, Opportunities, Internetworking, and Technology (DO-IT) | Report | http://www.washington.edu/doit/Brochures/Technology/wtcomp.html | Assistive technology resources | Network Administrators | Provides assistive technology guidelines for individuals overseeing the use of assistive technology. |

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|---|---|---|---|---|---|---|---|---|
| *Review of the Professional Literature on the Integration of Technology into Educational Programs* | Byrom, E. | 1998 | SERVE | Research--literature review | http://www.serve.org/technology/litreview.html | Technology Integration | Research | Review of the professional literature on technology integration. Addresses technology availability in American schools, barriers (lack of teacher time, access, vision, training and support), features of successful programs, and other findings. |
| *Internet Access in U.S. Public Schools and Classrooms: 1994-2000* | Cattagni, A., and Farris, E. | 2001 | National Center for Education Statistics | Report | http://nces.ed.gov/pubsearch/index.asp | Research -- survey data on national Internet use | Research | Longitudinal survey data about Internet access, and, since 1996, about the types of Internet connections used. |
| *Teacher Preparation STaR Chart: A Self-Assessment Tool for Colleges of Education* | CEO Forum on Education and Technology | 2000 | The CEO Forum on Education and Technology | Tool for Self-Assessment | | Certification and Professional Development | Certification and Professional Development Providers | Provides a self-assessment tool for colleges of education to evaluate the quality of their teacher preparation programs and use of technology. Another variant of the STaR process. |
| *Professional Development: A Link to Better Learning* | CEO Forum on Education and Technology | 1999 | The CEO Forum on Education and Technology | Report | http://www.ceoforum.org/reports.cfm?RID=2 | Professional Development, STaR | Professional Development | Discusses need to better prepare new teacher and veteran teachers to use technology more effectively to help students achieve higher academic standards and to improve education generally. Provides recommendations to schools of education, current teachers and administrators, policy makers, and corporations and businesses. |
| *The CEO Forum School Technology and Readiness Report:--The Power of Digital Learning: Integrating Digital Content* | CEO Forum on Education and Technology | 2000 | The CEO Forum on Education and Technology | Report | | Technology planning tool -- districts and schools | School Educational Leaders | The STaR chart has been repeated elsewhere. Most of the information is covered in other sources with more extensive research support. |
| *Computers and the Classrooms: The Status of Technology in U.S. Schools* | Coley, R., Cradler, J., and Engel, P. | 1997 | Educational Testing Service | Report | http://www.ets.org | Access to educational technology | Research | Describes milestones in educational technology, types of technology, student use of computers, impact, and software quality, and educational technology costs. |
| *Role-Specific Technology Leadership Tasks: Principal* | Collaborative for Technology Standards for School Administrators | 2001 | ISTE | Standards for School Educational Leaders | http://cnets.iste.org/tssa/ | Standards -- School Educational Leaders | School Educational Leaders | TSSA standards for principals. |
| *Role-Specific Technology Leadership Tasks: Superintendent* | Collaborative for Technology Standards for School Administrators | 2001 | ISTE | Standards for School Educational Leaders | http://cnets.iste.org/tssa/ | Standards -- School Educational Leaders | School Educational Leaders | TSSA standards for superintendents. |
| *Technology Standards for School Administrators: TSSA Draft (v4.0)* | Collaborative for Technology Standards for School Administrators | 2001 | ISTE | Standards for School Educational Leaders | http://cnets.iste.org/tssa/ | Standards -- School Educational Leaders | School Educational Leaders | Technology leadership standards, including leadership and vision, learning and teaching, productivity and professional practices, support, management, and operations, assessment and evaluation, and social, legal, and ethical issues. |
| *A School Administrator's Guide to Planning the Total Cost of New Technology* | Consortium for School Networking | 2001 | Consortium for School Networking | Report | http://www.classroomtco.org/project_pubs.html | TCO Technology planning tool | School Educational Leaders | Provides estimates on the total costs associated with implementing technology in schools. Includes technology integration models and worksheet. |
| *Professional Competency Continuum: Professional Skills for the Digital Age Classroom* | Coughlin, E., and Lemke, C. | 1999 | Milken Family Foundation | Guidance | http://www.milkenexchange.org | Guidance on professional development | Professional Development | Describes seven dimensions for gauging progress. Focuses on dimension three, professional competency. The continuum is based on the "stages of instructional evolution" identified in the research from the Apple Classrooms of Tomorrow program. |
| *Technology Resources for Washington's Educators: A LINKS Project Publication* | Craighead, D. | 1999 | OSPI | Report | | Tools for software assessment | Teachers | Provides a technical review of software matched to the EALRs. Provides software selection criteria and reviews software titles by platform, curriculum area, instructional design, and key words. |
| *Teacher Leadership Project--Impact Study* | Dean, D. | 2001 | | Report | | Research--Evaluation | School Educational Leaders | Report summarizes a study of the impact graduates of the Teacher Leadership Project (TLP) are having on their schools and communities. The study gathered quantitative data from TLP graduates and selected open-ended comments from building principals and teacher peers of TLP graduates. "Impact" was framed in terms of training and development activities, technology leadership activities, professional development activities, and other impacts. |
| *State Policy Framework for Assessing Educational Technology Implementation* | Dede, C. | 2001 | Northeast and the Islands Regional Technology in Education Consortium (NEIRTEC) | Report | http://www.neirtec.org | Technology planning--state | Policy Makers | Provides a series of measures and indicators for evaluating a state technology planning effort. Provides policy makers and state education leaders with a framework for assessing state technology policy development. |
| *Sharable Courseware Object Reference Model (SCORM)* | Dodds, P. (Ed.) | 2000 | Advanced Distributed Learning | Guidance | | SCORM | Network Administrators | Defines a reference model for sharable courseware objects that meet specified requirements. See discussions on technology-based instruction. |

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|---|---|---|---|---|---|---|---|---|
| *Michigan Technology Staffing Guidelines: III-C. Number of Technical Support Staff Needed in a School District* | Eastern Upper Peninsula ISD, Merit Network, Inc., Western Michigan University | 2000 | Michigan State | Tool--Staffing Estimates | http://techguide.merit.edu/staffing/htm | Tools--Staffing Estimates | School Educational Leaders | Section III-C of the Michigan Technology Staffing Guidelines provides a worksheet to estimate necessary network staffing. The report also contains a variety of information related to technology staffing, including staffing models and resources. |
| *The New Divides: Looking Beneath the Numbers to Reveal Digital Inequities* | Education Week | 2001, 2002, 2003, 2004, 2005 | Education Week | Report | http://www.edweek.org | Research--Survey data--national, state. Commentary, critique, analysis | Research | Comprehensive series of articles on educational technology access and equity issues. Provides comparisons between states, national data, commentaries, and critique. State data tables provide comparative measures. |
| *The New Divides: Looking Beneath the Numbers to Reveal Digital Inequities: State Data Tables* | Education Week | 2001 | Education Week | Data Table | http://www.edweek.org/sreports/tc01/tables/35capacity-t1.h20 | Teacher technology requirements | Teachers | List of states that require technology training as part of teacher re-certification requirements (4), as well as those that include technology training (26) or passing a technology test (3) in their requirements for initial teacher licensure. |
| *E-Defining Education: How Virtual Schools and Online Instruction are Transforming Teaching and Learning* | Education Week | 2002 | Education Week | Report | http://www.edweek.org/sreports/tc02/ | Technology Counts Survey | Research | Education Week's annual review of Technology Counts. Provides updated tables and information related to educational technology nationwide and in Washington State. Also provides articles reviewing specific technology issues related primarily to online learning initiatives. |
| *ESD112/State Standards for Voice/Video/Data Network Infrastructure in K12 Schools--Three Cable* | ETAC Infrastructure Working Group | 2002 | ETAC | Guidance | http://www.k12.wa.us/EdTech/infrastructureRec.aspx | Cabling standards, network administrators, infrastructure | Network Administrators | Guidelines for establishing a standard premise wiring plan for school districts. |
| *Principles of Effective Professional Development* | ETAC Professional Development Working Group | 2002 | ETAC | Guidance | http://www.k12.wa.us/EdTech/ProfDev.htm | Professional Development | Professional Development | Working group draft outlining principles of effective professional development, including: staff involvement, choice, modeling, focus on school-based, collaborative learning, alignment with curriculum, and improvement over time. |
| *PILOT Tool (Prepare to Integrate Learning with Technology)* | Educational Technology Support Centers | 2002 | ETSC | Tool--professional development | http://www.edtech.wednet.edu/pilot/ | Professional development tool | Professional Development | The PILOT (Prepare to Integrate Learning with Technology) tool is the result of a collaborative effort among the Educational Technology Support Centers. The site serves many purposes: It is an online, self-assessment tool (aligned to the ISTE National Educational Technology Standards) for educators to determine their levels of technology proficiency and classroom application. It is also a tool for districts to use with their staff to plan their professional development efforts. |
| *Technology Use in Classrooms Tiers Model* | Educational Technology Support Centers | 2004 | ETSC | Guidance | http://etsc.esd105.wednet.edu/Tiers/ | Teachers--Technology Use | Teachers | The Classroom Tiers of Technology Use Model was developed by the Educational Technology Support Center Directors in Washington State, and is included in the technology planning support documents for school districts. The intended outcomes of this model include: to answer the "What should we do with technology in classrooms?" question; to provide educators research/effective practice-based answers to technology integration questions; to be applicable to all teachers; to provide a common terminology for technology planning; to fit on one page; and to focus on teaching and learning rather than products. |
| *A+ Grade Checker* | Fife School District | 2002 | Fife School District | Web page | http://www.fifschools.com/schoolckr/gradeckr.cgi | Community involvement | Parents and Community | Web page is an example of how schools use the Internet to provide parental involvement, in this case, an online grade checker. |
| *Research on Computers and Education: Past, Present and Future* | Fouts, J. | 2000 | Seattle Pacific University | Report | | Research--Evaluation | School Educational Leaders | Reviews the current literature (2000) on computers and related technologies. Provides a framework of questions for further exploration. Sponsored by the Gates Foundation. |
| *The California Virtual School Report: A National Survey of Virtual Education Practice and Policy with Recommendations for the State of California* | Freedman, G., Darrow, R., and Watson, J. | 2002 | University of California College Prepatory Initiative | Report | http://www.edpath.com/images/VHSReport.pdf | Online courses; virtual schools | Policy Makers | "This study examines virtual high schools across the country, the state of virtual learning in California, and the state of the technologies supporting virtual education in order to explore a range of possibilities for a statewide online learning program." |
| *Technology Alliance Survey: A Follow-up Analysis of Technology in Washington Schools* | Friedman, D., and Erickson, K. | 2000 | Technology Alliance | Unpublished manuscript | http://www.technology-alliance.com/publications/resources.htm#education | Research survey data--Washington State | Gap Analysis | Follow-up survey of technology in Washington schools. See also original 1998 report. |
| *Guidebook for Developing and Effective Instructional Technology Plan* | Graduate Students at Mississippi State University | 1996 | Mississippi State University | Report | | Technology planning--guidance | School Educational Leaders | Guidance document describing technology planning process. |

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|---|---|---|---|---|---|---|---|---|
| *Professional Development in a Technological Age: New Definitions, Old Challenges, New Resources* | Grant, C. | | The Regional Alliance for Mathematics and Science Education | Article | http://ra.terc.edu/publications/TERC_pubs/tech-infusion/prof_dev/prof_dev_frame.html | Professional Development | Professional Development | Technology will never be used to its full extent unless teachers are provided professional development to guide their use. Many schools have sent teachers to training, but the results have fallen short. The paper examines the notion that professional development for technology use creates conditions that "highlight and underscore current problems in professional development in general." |
| *District Links Pay Hikes to Tech Mastery* | Guerard, E. | 2001 | eSchool News | Article | http://www.eschoolnews.org | Teacher technology requirements | Professional Development | Describes a technology proficiency plan drafted by a Texas school district that would freeze teacher salaries unless they demonstrate certain technology skills. |
| *Education with new Technologies: Networked Learning Community* | Harvard University | 2002 | Harvard | Guidance | http://learnweb.harvard.edu/ent/home/index.cfm | Professional development | Professional Development | Designed to help educators develop, enact, and assess effective ways of using new technologies through examples of effective technology lessons. |
| *TCO Calculator* | Institute for the Advancement of Emerging Technologies in Education (IAETE) | | IAETE | Tool--Total Cost of Ownership | http://www.iaete.org/tco/ | Total cost of ownership | School Educational Leaders | The Institute for the Advancement of Emerging Technologies in Education (IAETE) in February announced the release of the K-12 TCO Calculator, a free online tool that helps schools estimate and evaluate their total cost of ownership (TCO) for technology products and services. The TCO Calculator enables school technology planners and administrators to estimate the cost of a five-year plan and see the long-range impact their decisions will have on their technology and overall school budgets. |
| *The International Society for Technology in Education (ISTE) Educational Computing and Technology Standards* | International Society for Technology in Education (ISTE) | | ISTE | Standards for Network Administrators | http://www.iste.org | Standards--Network Administrators | Network Administrators | ISTE performance assessment standards for initial and advanced educational computing and technological programs, including Technology Facilitation, Technology Leadership, and Secondary Computer Science Education. |
| *National Educational Technology Standards for Students: Connecting Curriculum and Technology* | International Society for Technology in Education (ISTE) | 2000 | ISTE | Standards for Students | http://www.iste.org | Standards--Students, NETS | Students | Part of the National Educational Technology Standards (NETS) project, ISTE promotes the development of national standards for educational uses of technology that facilitate school improvement in the United States. Report describes standards and supporting curriculum for students. |
| *National Educational Technology Standards for Students: Connecting Curriculum and Technology* | International Society for Technology in Education (ISTE) | 2000 | ISTE | PowerPoint | http://www.iste.org | Standards--Students, NETS | Students | PowerPoint presentation of the National Educational Technology Standards (NETS) project, ISTE promotes the development of national standards for educational uses of technology that facilitate school improvement in the United States. Report describes standards and supporting curriculum for students. Slide 12 shows "Establishing New Learning Environments" from traditional to new. This includes a number of dimensions for consideration, although the terms are highly value-laden. |
| *National Educational Technology Standards for Teachers* | International Society for Technology in Education (ISTE) | 2000 | ISTE | Standards for Teachers | http://www.iste.org | Standards--Teachers | Teachers | Part of the National Educational Technology Standards (NETS) project, ISTE promotes the development of national standards for educational uses of technology that facilitate school improvement in the United States. Document provides standards for teachers and supporting performance profiles. |
| *Will New Teachers Be Prepared to Teach in a Digital Age?* | International Society for Technology in Education (ISTE) | 1999 | ISTE | Report | http://www.iste.org | Teacher preparation, professional development | Professional Development | National survey on information technology in teacher education. In general (and consistent with other survey findings, including Washington), technology infrastructure of education has increased more quickly than the incorporation of IT tools into teaching and learning. This raises the chicken and egg issue of which should (have) come first: the technology infrastructure or the professional development skills? Without the former, the latter would be practically difficult if not impossible. Without the latter, however, teachers constantly lag behind in being prepared to take advantage of the latest and rapidly evolving technology applications. |
| *CEO Forum Interactive School Technology and Readiness (STaR) Chart* | International Society for Technology in Education (ISTE) | 2002 | ISTE | Tool--Assessment | http://ww2.iste.org/starchart | Technology planning tool--district | School Educational Leaders | Online STaR chart planning tool. Designed to assess whether school is using technology effectively, the school's current education technology profile, and areas for improvement. The STaR Chart is used to help schools set benchmarks and goals, apply for grants, determine funding priorities, and create individualized assessment tools. |
| *Standards for Technological Literacy: Content for the Study of Technology* | International Technology Education Association | 2000 | ITEA | Report | http://www.iteawww.org | Technology Literacy | Key Concepts | Defines technological literacy for students. "…technology is how people modify the natural world to suit their own purposes." "Technology literally means the act of making or crafting…" Provides broad overview of educational technology and applications, including technology content standards. |
| *Implementation of Technology: A Developer's Guide to the Assessment of Progress* | ITA/WESTED | 1998 | ITA/WESTED | Tool--Technology Assessment | | Technology assessment--checklist | School Educational Leaders | This is more of a checklist for self-evaluating the major steps in a technology implementation plan. A tool of sorts, it can help administrators review where they are at along several planning dimensions. |
| *Information Literacy for the Communication Age* | Jukes, I., et al. | 1998 | Net Savvy/Info Savvy Group | Report | | Guidance--technology planning | School Educational Leaders | Overview and guidance for integrating Internet and information technology into the classroom. Provides specific lesson planning guidance and examples. |

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|---|---|---|---|---|---|---|---|---|
| *Schools to Spend Billions on Technology* | Kane, M. | 2002 | Yahoo! News | Article | http://www.news.com | Educational technology spending | Funding | School district expenditures on educational technology rose almost 16 percent over last year, $9.5 billion total nationally. Computer hardware accounts for one fourth of district technology budgets. Other trends cited. |
| *Technology Support Index (Version 1.10)* | Kimball, C. | 2002 | ISTE | Tool--Technology Support Index | http://www.iste.org | Technology support tool | Network Administrators | Technology support index identifies several domains for schools to assess technology support: equipment standards, staffing and processes, professional development, intelligent systems. The dimensions describing current status are emergent, islands, integrated, exemplary. |
| *Report to UNESCO: Attacking Urban Poverty: How Universities Can Help.* | Kornblum, W. | 1998 | | Report | | Research | School Educational Leaders | Educational technology for high-risk students. Cited in Wilhelm, Carmen, and Reynolds (2002). |
| *Electronic Collaboration: A Practical Guide for Educators* | Koufman-Frederick, et al. | 1999 | Northeast and Islands Regional Educational Laboratory | Report | File Source: elec-collab.pdf | Professional Development--Guidance, Collaboration | Professional Development | Guidance on electronic collaboration among educators. |
| *TEAMS Distance Learning Professional Development Model* | Lane, C. | | WestEd | Article | http://www.wested.org/tie/dlrn/teams.html | Professional Development Model | Professional Development | Three-Tier Distance Learning Staff Development Model provides theoretical training information, implementation training theory, simultaneous teacher training and student instruction. |
| *Technology in American Schools: Seven Dimensions for Gauging Progress--A Policymaker's Guide* | Lemke, C., and Coughlin, E. | 1998 | Milken Exchange on Education Technology | Report | http://www.mff.org/publications/publications.taf?page=158 | Framework, Concepts | Key Concepts | Describes seven dimensions for gauging progress. 1. Learners. 2. Learning Environments. 3. Professional Competency. 4. System Capacity. 5. Community Connections. 6. Technology Capacity. 7. Accountability. |
| *Bringing a Nation Online: The Importance of Federal Leadership* | Leslie Harris & Associates | 2002 | Leadership Conference on Civil Rights Education Fund and the Benton Foundation | Report | http://www.civilrights.org/publciations/bringinganationonline/ | Digital divide | Policy Makers | Examines Department of Commerce data showing substantial gains in access to computers and the Internet. The report underscores that, despite these gains, a significant divide remains based on income, race, and ethnicity, geography, and disability. |
| *The Digital Disconnect: The Widening Gap Between Internet-Savvy Students and Their Schools* | Levin, D., and Arafeh, S. | 2002 | Pew Internet and American Life Project | Report | http://www.pewinternet.org/reports/toc.asp?Report=67 | Research | School Educational Leaders | Qualitative survey of student perceptions and experiences with the Internet. Describes issues related to student Internet use and school policies. |
| *Preparing for the Idaho Technology Performance Assessment: Information for Idaho Teachers and Administrators* | Lewis-Clark State College, Lewiston, ID | | LCSC | Tool--technology performance assessment | http://www.lcsc.edu/education/t4t/prepho.htm | Technology performance assessment | Professional Development | "The Idaho Technology Performance Assessment consists of six computer-based tasks. To pass the entire assessment, all six tasks must be passed. If any tasks are attempted but not passed only those tasks not passed need be retaken. A teacher can take all six tasks or as few as one task per person." |
| *Teachers' Professional Development in a Climate of Educational Reform* | Little, J. | 1993 | Educational Evaluation and Policy Analysis, 15(2), 129-151. | Article | | Professional Development, Education Reform, Workshops | Professional Development | This article is referenced in the teacher recommendations. See, "Workshops with Real Work." |
| *Maryland Teacher Technology Standards* | Maryland State Department of Education | 2002 | Maryland State Department of Education | Standards--Teachers | | Standards--Teachers | Teachers | Teacher educational technology standards. |
| *OnTarget: Online Technology Inventory & Evaluation System* | Maryland State Department of Education | | Maryland State Department of Education | Tool--technology planning | http://msde2.aws.com/results | Technology Assessment--Inventory | State of the State | Interactive website for Maryland Schools. Shows technology inventory results by state, local school system, and by school. Shows Digital Divide results, and the State Technology Plan. |
| *Data Standards Handbook for the Massachusetts Student Information Management System: Reference Guide Version 1.1* | Massachusetts Department of Education | 2000 | Massachusetts Department of Education | Guidance | | Data standards, SIMS | Network Administrators | The data standards handbook is intended to provide public school districts (in Massachusetts) with the information needed to implement SIMS data standards. |
| *Massachusetts Recommended PreK-12 Instructional Technology Standards* | Massachusetts Department of Education | 2001 | Massachusetts Department of Education | Standards--Students | | Standards--Students | Students | Student instructional technology standards. |
| *Creating Learning Cultures with Just-in-Time Support* | McKenzie, J. | 1998 | staffdevelop.org | Article | http://staffdevelop.org/adult.html | Professional Development, Coaching, Technology Mentors | Professional Development | Discusses notion of "just-in-time" (a total quality management concept) in terms of application to technology assistance and ongoing professional development. |

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| *Enabling Professional Development: What Has Been Learned?* | McLaughlin, M. | 1991 | New York Teachers College Press | Article | | Professional Development, Coaching, Technology Mentors | Professional Development | This article is referenced in the teacher recommendations. See, "Coaching/Technology Mentors." |
| *Metiri Group: Range of Use* | Metiri Group | 2002 | Meteri Group | Chart | http://www.metiri.com/WebInvestigation/RangeOfUse.htm | Range of Use | Key Concepts | Provides the range of use chart. Shows how students and teachers can develop educational technology proficiency across the spectrum of complexity of learning (y axis), instructional approach to learning (x axis), and authenticity of learning (z axis). |
| *ESL Independent Study Lab* | Michael Krauss | 2002 | Lewis and Clark College | Web page | http://www.lclark.edu/~krauss/toppicks/toppicks.html | ESL resources | Students | "The ESL Independent Study Lab now includes over 180 high quality resources for ESL/EFL learners. The Lab is organized by language ability and includes resources for listening, reading, writing, vocabulary, grammar, pronunciation, TOEFL, and fun & games (all educational). All links have been checked for accuracy. Your students are also invited to follow the "Interact" links, which are written extension activities for many of the Web sites in the Lab. The writing is submitted to me via email and I will post the student work at the Lab." |
| *AnyTime, Any Place, Any Path, Any Pace: Taking the Lead on e-Learning Policy* | National Association of State Boards of Education | 2001 | NASBE | Policy | http://nasbe.org/index.html e-learning.pdf | Educational Technology Policy. Technology Literacy. National Goals. ESEA. | School Educational Leaders | Describes National Association of State Boards of Education policy statement on educational technology: "Having examined the emerging evidence and considered the doubts and cautions, the NASBE Study Group on e-Learning concludes that ***e-learning will improve American education in valuable ways and should be universally implemented as soon as possible."*** Recommendations: revise learning standards, bring state assessments online, streamline policies; and empower families. Provides research summaries and specific policy recommendations and considerations. |
| *Building the 21st Century School* | National Center for Supercomputing Applications (NCSA) | 2002 | NCSA | Tool--technology planning | http://archive.ncsa.uiuc.edu/IDT | Tools--technology planning | School Educational Leaders | School technology planning process. One example. Provides detailed information on each step o the planning process. The process itself is simple. Resources are provided pertaining to classroom technologies with definitions of key terms. |
| *Information Technologies in Education: A Survey of Uses and Issues* | National Foundation for the Improvement of Education | | National Education Association (NFIE) | Report | | Research | Research | Overview of information technology uses in schools and related issues and scenarios. |
| *Being Fluent with Information Technology* | National Research Council | 1999 | National Research Council | Report | http://www.nap.edu | Information technology literacy. Standards | Key Concepts | Discusses "information technology literacy." Describes the components of fluency with information technology; intellectual capabilities; information technology concepts; and information technology skills. This report should be cited in the discussion of standards and technology literacy. |
| *Education Leadership Toolkit* | National School Boards Foundation | 2002 | NSBF | Web page | http://www.nsba.org/sbot/toolkit/index.html | Educational leadership, planning | School Educational Leaders | Described as a "toolkit," the web page provides supporting information related to educational technology adoption through a use of questions and answers, along with relevant resources related to such topics as planning and funding. |
| *Are We There Yet? Research and Guidelines on Schools' Use of the Internet* | National School Boards Foundation | 2002 | NSBF | Report | http://www.nsbf.org/thereyet/fulltext.htm | Internet Use | Research | Reviews schools' use of the Internet. Concludes that schools are "still unable to take full advantage of technology." Survey of 811 school districts. Discusses Internet use for instructional purpose, online learning, and other measures. |
| *NC Technology Competencies for Educators* | NC Public Schools.org | | North Carolina Public Schools | Standards--Teachers | http://www.ncpublicschools.org/tap/techcomp.htm | Standards--Teachers | Teachers | "The North Carolina Technology Competencies for Educators were established for all North Carolina educators to obtain, in order to use information technologies to support effective teaching and enhance overall teacher productivity." |
| *Connecting the Bits* | NEA Foundation for the Improvement of Education | 2002 | National Education Association (NEA) | Web page | http://www.nfie.org/publications/connecting.htm | Teacher educational technology resources | Teachers | Provides information for integrating technology into teaching and learning in K-12 schools. |
| *Nebraska Student Essential Learnings in Technology: Guidelines from the Nebraska Department of Education* | Nebraska Department of Education | | Nebraska Department of Education | Standards--Students | | State standards | Gap Analysis | The essential learnings in technology are based on the ISTE NETS, with some modifications. Example useful to show how other states have adopted the international standards. |
| *Home Computers and Internet Use in the United States: August 2000* | Newburger, E. | 2001 | U.S. Census Bureau | Report | | Research--Computers and Internet Use | Research | Statistical profile of home computer and Internet use. Shows change over time from 1984 to 2000. Provides detailed statistical breakdown of census data. |

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| *Educational Technology Policy Survey of the Fifty States* | North Carolina Board of Science and Technology | 2001 | North Carolina Board of Science and Technology | Survey--Other states | | State technology surveys | Gap Analysis | Comparison of technology development in other states. Different items than those used by SIIA and Education Week. Although there is some overlap, another useful reference resource. |
| *The enGauge Framework: Six Essential Conditions for the Effective Use of Technology in Learning (Draft)* | North Central Regional Educational Laboratory | 2000 | NCREL | Guidance | http://www.ncrel.org/engauge | Essential Conditions | Key Concepts | Describes conditions and indicators for effective use of technology in learning: 1. Forward-thinking, Shared Vision. 2. Effective Teaching & Learning Practice. 3. Educator Proficiency. 4. Digital-Age Equity. 5. Robust Access. 6. Systems and Leadership. |
| *enGauge* | North Central Regional Educational Laboratory | | North Central Regional Educational Laboratory (NCREL) | Tool--technology planning | http://www.ncrel.org/engauge | Technology planning--district/school | School Educational Leaders | Online planning tool for educational technology integration. Evaluates conditions for success (vision, practice, proficiency, equity, access, and systems) as well as indicators for these conditions. |
| *North Kitsap Technology Standards* | North Kitsap School District | 2002 | North Kitsap School District | Standards--Students | | Standards--Students | Students | Matrix of student technology standards in North Kitsap School District, Poulsbo, WA. |
| *Technology Briefs for NCLB Planners* | Northeast and the Islands Regional Technology in Education Consortium | 2002 | NEIRTEC | Guidance | http://www.neirtec.org/products/techbriefs/default.asp | ESEA--Guidance | School Educational Leaders | Technology Briefs for NCLB planners provides guidance for U.S. Department of Education requirements for state and local applications, and they provide NCLB planners with effective strategies, key questions to consider, and selected resources that will inform the application and planning process. |
| *Technology Planning: Bibliographies* | Northwest Educational Technology Consortium | 2002 | NETC | Bibliography | http://www.netc.org/tech_plans/resources_online.html | Bibliographic resource links | School Educational Leaders | Technology planning resource links. Provides links for state planning, district planning, and school technology planning. Also provides wider net of articles and research beyond planning per se. Can be used for policy makers and school educational leaders. |
| *Report to the Legislature on The Washington State Technology Plan for the K-12 Common School System* | Office of Superintendent of Public Instruction (OSPI) | 1994 | OSPI | Report | http://www.k12.wa.us/edtech/plan.aspx | 2002 Technology plan | Introduction: Background | Report on the 2002 technology planning process. Includes state of the state, gaps, recommendations, legislation, definitions, timelines, supporting research, bibliography |
| | Office of Superintendent of Public Instruction (OSPI) | 2002 | OSPI | Report | http://www.k12.wa.us/edtech/techplan.aspx | 1994 Technology plan | Introduction: Background | Report on the 1994 technology planning process. Includes state of the state, gaps, recommendations, legislation, definitions, timelines, supporting research, bibliography |
| *Washington K-12 Building Technology Inventory Results* | Office of Superintendent of Public Instruction (OSPI) | 2004 | OSPI | Highlights | http://www.k12.wa.us/edtech/Survey.aspx | Building Technology Survey | State of the State | Bulleted list of highlights from latest technology survey |
| *Washington State Consolidated Application For Federal Funds Under the Elementary and Secondary Education Act "No Child Left Behind"* | Office of Superintendent of Public Instruction (OSPI) | 2002 | OSPI | Grant application | http://www.k12.wa.us/ESEA/ | ESEA, No Child Left Behind, federal requirements | Legislative Charge | Washington State consolidated application for federal ESEA funding includes educational technology funding under various titles. |
| *The Elementary and Secondary Education Act "No Child Left Behind Act of 2001": Major Issues and Questions* | Office of Superintendent of Public Instruction (OSPI) | 2002 | OSPI | Report | http://www.k12.wa.us/ESEA/ | ESEA, No Child Left Behind, federal requirements | Legislative Charge | Supplement to consolidated application provides answers to key policy questions. |
| *Olympia School District: Technology Skills and Benchmarks* | Olympia School District | 2002 | Olympia School District | Standards--Students | | Standards--Students | Students | Matrix of student technology standards in Olympia School District, Olympia, WA. |
| *Generation www.Y Executive Summary 1996-2001* | Olympia School District | 2001 | Olympia School District | Report | | Tools--Internet | School Educational Leaders | Describes the Gen Y Web site tools and features. |
| *Oregon State University Software Access Guidelines* | Oregon State University | 2002 | Oregon State University | Web page | http://oregonstate.edu/dept/tap/Policy/soft.html | Assistive technology resources | Network Administrators | Provides assistive technology guideliens for individuals overseeing the purchase of information technology. |
| *A Guide to Networking for K-12 Schools* | OSPI, Northwest Educational Technology Consortium (NETC) | 1997 | OSPI | Guidance | http://www.netc.org/network_guide/ | Guidance--networking | Network Administrators | Provides network guidance to schools, networking information, and planning information and planning assistance for technology coordinators. Designed to help network administrators as well as "non-techie" staff in understanding network basics. |

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| *Linking for Learning: A New Course for Education* | OTA | 1989 | Office of Technology Assessment | Report | | Historical | Research | Describes educational technology development, referred to as "distance education." Predates rise of Internet and is really more of a historical document useful for showing comparisons or changes over time. |
| *The 2002 State New Economy Index* | Progressive Policy Institute | 2002 | PPI | Report | http://www.neweconomyindex.org/states/2002/index.html | Research & Evaluation | Gap Analysis | Index uses 17 indicators measuring degree to which state economies were structured and operated according to the tenets of the New Economy. The Technology in Schools measure examines five factors: students per multimedia computers, students per internet connected computer, percentage of schools with Internet access through a T1 or cable modem, percentage of schools where at least 50 percent of teachers use the Internet in class, and the percentage of schools where at least 50 percent of teachers have school-based email addresses. A number of states that are furthest ahead in integrating information technology into schools are the less populated and more geographically dispersed states, suggesting that a motivating factor is the desire to establish better connections to information and resources. Surprisingly, a number of states with strong technology economies score notably low on this measure, including Connecticut, Maryland, New Hampshire, and California, which ranks last. Overall, Washington is ranked 2nd only to Massachusetts across the 17 indicators. However, on the measure of Technology in Schools, Washington is ranked 27th.. |
| *The Northwest Regional Profile: Integration of Technology in Preservice Teacher Education Programs* | Queitzsch, M. | 1997 | NETC | Report | http://netc.org/preservice/challenge.html#survey | Preservice technology integration | Certification and Professional Development Providers | Technology survey in pre-service programs. Although the survey is dated at this point, the general structure and overall findings are relevant. Suggests the types of problems and issues that pre-service providers were encountering as well as specific needs. |
| *Guiding Questions for Technology Planning, Version 1.0* | Regional Technology in Education Consortia | 1996 | North Central Regional Technology Education Consortium | Tool for technology planning | | Technology planning tool -- districts and schools | School Educational Leaders | Guidance document describing technology planning process. |
| *The Learning Return on Our Educational technology Investment: A Review of Findings from Research 2002* | Ringstaff, C., and Kelley, L. | 2002 | WestEd | Report | http://www.westedrtec.org | Research -- Evaluation -- educational technology | Research | Current review of evaluation research on the implementation of computer-based technology in K-12 education. Summarizes research studies with focus on methodologically sound studies, including Apple Classroom of Tomorrow (ACOT), West Virginia's Basic Skills/Computer Education Program, and IBM's Reinventing Education program. |
| *Professional Development and Implementation Model* | San Benito Consolidated Independent School District | | San Benito Consolidated Independent School District | Web page | http://www.sanbenito.k12.tx.us/tech_staffdev/staff_model.html | Professional Development Model | Professional Development | Web page displays the professional development and implementation model designed by Curriculum Advantage, Inc. |
| *San Diego Technology Foundations: Knowledge and Skills K-12 Matrix* | San Diego Schools Educational Technology Department | | San Diego Schools | Standards: Students | http://edtech.sandi.net/tech/matrix/matrixoverview.html | Standards--students | Students | "The Technology Foundations: k-12 Knowledge and Skills Matrix identifies 18 technology areas and their encompassing skills used in K-12 education. The matrix mirrors the National Educational Technology Standards for Students and is intended to be used as a guide in conjunction with district content and performance standards." |
| *The Impact of Education Technology on Student Achievement: What the Most Current Research Has to Say* | Schacter, J. | 1999 | Milken Family Foundation | Report | http://www.mff.org/publications/publications.taf?page=161 | Research--Evaluation. Educational technology | Research | Review of evaluation research on the impact of education technology on student achievement. Provides research summaries of meta-analyses, describing "positive findings," "inconclusive findings," and "negative findings." |
| *Tech Support Model* | Seiler, R. | 2002 | Sequim School District | PowerPoint | | Technology support model | Network Administrators | PowerPoint presentation discussing technology support issues and model solutions. End slide speaks to technology plan needs. |
| *Nine Characteristics of High Performing Schools* | Shannon, G. S. | 2001 | OSPI | Bibliography | http://www.k12.wa.us/assessment/NineCharact.aspx | Research -- Nine Characteristics | Key Concepts | Provides the names of key websites, books, reports, and articles that can be used to help schools improve in each of the characteristics of high-performing schools: 1. Clear and shared focus; 2. High standards and expectations for all students; 3. Effective school leadership; 4. High levels of communication and collaboration; 5. Curriculum, instruction and assessments aligned with state standards; 6. Frequent monitoring of learning and teaching; 7. Focused professional development; 8 Supportive learning environment; 9. High levels of parent and community involvement. |
| *Assessing the Impact of Instructional Technology on Student Achievement* | Sherry, L., Billig, S., Jesse, D., and Watson-Acosta, D. | 2001 | T_H_E_Journal.htm | Report | | Research--technology infusion | Research | Purpose of project was to infuse standards-based instruction in multimedia, digital art, music composition, and online discourse into the general arts and humanities curricula of Vermont K-12 schools. Evaluated motivation, metacognition, and inquiry learning. Among other findings, "there was a significant correlation between motivation and metacognition, indicating that students' enthusiasm for learning with technology may stimulate student's metacognitive (strategic) thinking processes." |

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| *Evaluation of the Use of Technology in Illinois Public Schools: Final Report* | Silverstein, G., Frechtling, J. and Miyaoka, A. | 2000 | Westat | Report | | Research & Evaluation of learning technologies | Research | Presents findings from an evaluation of the use and impact of "learning technologies" in Illinois public schools. In particular, the study evaluated whether teachers and students had access to--and were making use of--computers and the Internet, as well as the link between schools' use of learning technologies and student achievement. Key evaluation measures included access to learning technologies, professional development and technical proficiency, use of learning technologies, factors that influence the use of learning technologies in the classroom, and the impact of learning technologies on student achievement. |
| *Teachers' Tools for the 21st Century: A Report on Teachers' Use of Technology* | Smerdon, B., et al. | 2000 | U.S. Department of Education, National Center for Education Statistics | Report | http://nces.ed.gov/pubsearch/index.asp | Research--Survey data--national. Internet use. | Research | NCES administered a short survey of public school teachers in 1999 that included items on teachers' use of computers and the Internet. The report draws on that survey to describe teachers' use of computers and the Internet, including use of education technology in classrooms and schools, teacher training and preparation for their use, and barriers to technology use. |
| *Education Anytime, Anywhere: Redefining Education* | Software and Information Industry Association | 2000 | SIIA | Article | | Commentary and critique | State of the State | Provides a marketing perspective, with some limited analysis, of the development of educational technology and current status. Bibliography provides additional sources. |
| *Schools Interoperability Framework Implementation Specification, Version 1.0* | Software and Information Industry Association | 2000 | SIIA | Guidance | http://www.sifinfo.org | Schools Interoperability Framework (SIF) | Network Administrators | Schools Interoperability Framework (SIF) enables different software applications to exchange data efficiently, reliably, and securely regardless of what platforms are hosting the applications. "SIF is an effort to promote interoperability between software applications from different vendors without requiring each vendor to learn and support the intricacies of other vendor's applications." Working groups develop applications in such areas as data analysis and reporting, food services, grade book, and student information services. |
| *Software and Information Industry Association State Technology Initiatives Report* | Software and Information Industry Association | 2001 | Software and Information Industry Association | Survey--Other states | | State technology surveys | Gap Analysis | Comparison of technology development in other states. Washington's data from OSPI is in SIIA Report 7-15-01.doc and SIIA Report-11-1.doc. These updates are useful for the state of the state discussion. |
| *Progress of Technology in the Schools: Report of 27 States* | Solmon, L., and Widerhorn, J. | 2000 | Milken Family Foundation | Report | http://www.mff.org/publications | Research--Survey Data--27 states | Research | Second annual Survey of Technology in the Schools. Describes progress in implementing technology plans, teacher views of technology, specific technology applications, effects on student learning, professional development, funding, basic statistical information, levels of support by stakeholder. |
| *Profiler* | SouthEast Initiatives Regional Technology in Education Consortium (SEIR*TEC) | 2002 | SEIRTEC | Tool--professional development | http://profiler.scrtec.org/ | Evaluation -- district planning -- staff survey -- professional development | Teachers | Reviews technical competencies through online survey forms that can be used for school-wide or district planning The questions are helpful indicators of specific technical competencies. |
| *Technology in Public Education in the United States.* | Statham, D., and Torell, C. | 1999 | Texas Education Agency | Report | http://www.tea.state.tx.us/Textbooks/archives/litrevie.htm | Research | Research | Review of educational technlogy literature. |
| *The Development of Professional Developers: Learning to Assist Teachers in New Settings in New Ways* | Stein, M., Smith, M., and Silver, E. | 1999 | Harvard Educational Review | Journal article | | Certification and Professional Development | Certification and Professional Development Providers | Focused on certification and professional development providers, the article is generally focused on improving the relationship between teachers and providers. Not specifically focused on technology. |
| *Report and Recommendations: Findings of the Technology in Education Task Force* | Technology Alliance | 1998 | Technology Alliance | Report | http://www.technology-alliance.com/publications/resources.htm#education | Research survey data--Washington State | Gap Analysis | Survey of technology use in Washington schools. Also includes related critique, commentary, and resources. |
| *2001-2002 Texas STaR Chart: A Tool for Planning and Assessing School Technology and Readiness Aligned with the Texas Long-Range Plan for Technology* | Texas Education Agency | | Texas Education Agency | Tool--Assessment | http://www.tea.state.tx.us/technology/etac | Technology planning tool--district and school | School Educational Leaders | The Texas STaR Chart was developed around the four key areas of the Texas Long-Range Plan for Technology, 1996-2010: Teaching and Learning, Educator Preparation and Development, Administration and Support Services, and Infrastructure for Technology. Provides 22 measures across four levels of progress (early tech, developing tech, advanced tech, and target tech). |
| *1998-2000 Long-Range Plan for Technology of the Texas State Board of Education* | Texas State Board of Education | 1988 | Texas State Board of Education | Policy | | State Technology Plan | Research | Texas state technology plan example. |
| *State of the States Survey* | The Journal.com | 2002 | The Journal.com | Report | http://www.thejournal.com/magazine/StateoftheStates/stateofthestates.pdf | Research--Survey Data--31 states | Gap Analysis | The Journal surveyed states (with 31 responding) to their technology questions. Adds to the gap analysis from other state by state surveys. |

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| *Educational Technology: Are School Administrators Ready for It?* | Thomas, W. | 1999 | SREB | Research--Educational Leaders Professional Development | http://www.sreb.org/programs/EdTech/pubs/pubsindex.asp | Professional Development--School Educational Leaders | School Educational Leaders | Survey of pre-service programs that, according to author, show that administrators are not adequately prepared for technology integration in schools. |
| *Elements of Successful Online Professional Development Programs* | Treacy, B., Kleiman, G., and Peterson, K. | 2002 (in press) | Education Development Center, Inc. | Report | http://www.neirtec.org | Professional Development | Professional Development | Reviews elements of successful online professional development programs. Online professional development (OPD) uses the Internet to provide Web-based learning opportunities, including educational programs, courses, workshops, activities, resources, and online interactions with instructors, mentors, and colleagues. The OPD model combines readings, activities, and facilitated peer-to-peer, collaborative discussions. |
| *School Technology: Five School Districts' Experiences in Funding Technology Programs* | U. S. General Accounting Office | 1998 | GAO | Report | | Funding models | Funding | Examines how five school districts funded their technology goals and their difficulties in finding these resources. Study included Seattle School District. Provides supporting research and funding models. |
| *U.S. Department of Education Community Update* | U.S. Department of Education | 2001 | U.S. Department of Education | Article | | Community involvement | Parents and Community | Series of U.S. Department of Education articles on educational technology. |
| *Toward A New Golden Age In American Education: How The Internet, The Law And Today's Students Are Revolutionizing Expectations* | U.S. Department of Education | 2004 | U.S. Department of Education | National Educational Technology Plan | http://nationaledtechplan.org/ | National -- Educational Technology Plan | Policy Makers and School Educational Leaders | To help states and districts prepare today's students for the opportunities and challenges of tomorrow, the plan presents seven action steps and accompanying recommendations: Strengthen Leadership; Consider Innovative Budgeting; Improve Teacher Training; Support E-Learning and Virtual Schools; Encourage Broadband Access; Move Toward Digital Content; Integrate Data Systems |
| *e-Learning: Putting a World-Class Education at the Fingertips of All Children--The National Educational Technology Plan* | U.S. Department of Education | 2000 | U.S. Department of Education | Policy | http://www.ed.gov/pubs/edpubs.html | Educational Technology Policy -- Technology Literacy -- National Goals -- ESEA. | Policy Makers | Outlines the U.S. Department of Education's national strategy for technology in education. Goals: 1. All students and teachers will have access to information technology in their classrooms, schools, communities, and homes. 2. All teachers will use technology effectively to help students achieve high academic standards. 3. All students will have technology and information literacy skills. 4. Research and evaluation will improve the next generation of technology applications for teaching and learning. 5. Digital content and networked applications will transform teaching and learning. This discussion should tie into ESEA discussion of technology literacy and performance measures. |
| *Assessing the Educational Technology Proficiencies of Students and Educators* | U.S. Department of Education | 2001 | U.S. Department of Education | Concept Paper | | Research--educational technology proficiency | State of the State | Reviews and synthesizes research on efforts to measure, report, and use data on student, teacher, and administrator proficiencies in the knowledge and use of educational technology. This is not the report, only a concept paper of the proposed research. Frames the theoretical questions to be addressed. |
| *U.S. Department of Education Educational Technology Evaluation Activities* | U.S. Department of Education | 2002 | DOE | Web page | http://www.ed.gov/offices/OUS/PES/edtech_public.html | Research--Evaluation | Research | Review of U.S.Deparment of Education evaluation activities related to educational technology, including TLCF, ISET, E-rate, and other educational technology programs. |
| *United States Open e-learning Consortium* | United States Open e-learning consortium | 2002 | USOeC | Report | http://www.ctlt.org/projects/us_open_e_learning/exec_summ.php | Network standards | Network Administrators | Part I of the final report consists of three policy papers (about 50 pages) and provides an understanding of the issues, the problems, and the solutions in developing an effective state-to-state assessment item exchange. --Paper #1: Why a State2State Assessment Exchange? (Barbara Clements) --Paper #2: What technology barriers did we identify (Phil Crocker) --Paper #3: How do we solve the topic classification issue? (Michael Jay) Part II is an in-depth analysis of the Technical Specifications needed to implement a state-to-state assessment item exchange. -Paper #4: How do we pick an XML (eXtensible Markup Language) schema? (Tom Vreeland) Though this document is very technical and over 270 pages, its importance is critical for the development of a functioning system. |
| *Summary of Proceedings from the Virtual High School Summer Institute 2002* | University of California College Prepatory Initiative | 2002 | University of California College Prepatory Initiative | Conference proceedings | http://www.edpath.com/images/VHSIProceedings.pdf | Online learning; virtual schools | Policy Makers | Summary of Proceedings from the Virtual High School Summer Institute 2002 [Hosted by the University of California College Preparatory Initiative with support from WCET and funded by the William and Flora Hewlett Foundation]The Virtual High School Institute 2002 hosted more than 50 virtual high school leaders from across the country. This summary encapsulates the extensive amount of information that came out of 2.5 days of discussions on August 15-17, 2002. |
| *DO-IT Resources for K-12 Educators* | University of Washington | 2002 | Disabilities, Opportunities, Internetworking, and Technology (DO-IT) | Web page | http://www.washington.edu/doit/Resources/k12-edu.html | Assistive technology resources | Teachers | DO-IT maintains resources for K-12 educators to help students with disabilities, including academic resources for K-12 educators, college preparation resources for students, and career preparation resources for K-12 educators. |

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|---|---|---|---|---|---|---|---|---|
| *Catalyst* | University of Washington | | Catalyst | Tool--teaching resources | http://catalyst.washington.edu/home.html | Teaching tools, resources, and support | Professional Development | The Catalyst Web site provides tools, resources, and support to teachers with new technologies. Interactive website provides profiles, teaching tools, action plans, how-to instructions, workshops and clinics, and web tools. |
| *Funding Manual: Paying for the Assistive Technology You Need* | University of Washington Center for Technology and Disability Studies | 2002 | University of Washington | Report | http://uwctds.washington.edu/funding%20manual/index.htm | Assistive technology resources | Network Administrators | Chapter IV describes the rights of students with disabilities to Assistive Technology (AT) in education, including public and private elementary and secondary schools and higher education. The chapter also discusses other options for funding AT for students with disabilities. Also applicable to teachers and to school educational leaders. |
| *Evaluation Standards and Criteria for Technology Implementation* | Valdez, G. | 2002 | NCREL | Guidance | http://www.ncrel.org/landl/eval1.htm | Evaluation standards, Guidance | Policy Makers | Lays out evaluation standards for technology implementation. Guidance document primarily intended for policy makers or school educational leaders. |
| *The Power of the Internet for Learning: Moving from Promise to Practice* | Web-Based Education Commission | 2000 | Web-Based Education Commission | Report | | Policy making, Internet | Policy Makers | The Web-Based Education Commission is a congressional committee that explored Web-based learning and policy implications, including the digital divide, professional development, lack of research and development, online content, restrictions to e-learning, and privacy, protection, and "safe streets." |
| *How Teaching Matters: Bringing the Classroom Back into Discussions of Teacher Quality* | Wenglinsky, H. | 2000 | Educational Testing Service | Report | | Teacher preparation, professional development | Teachers | The study presented in this report explores a route to improving teacher quality, "namely, improve teachers' classroom practices." The study examines the link of classroom practices to student academic performance by analyzing data from the National Assessment of Educational Progress (NAEP). Teacher quality, particularly classroom practices, should be singularly targeted by policy makers to improve academic achievement. |
| *WestEd Tech Plan Home Page* | WestEd | 2002 | WestEd | Tool--professional development | http://www.wested.org/tie/techplan.welcome.shtml | Tools--technology planning | School Educational Leaders | The WestEd Technology Planning Toolkit Home Page is actually intended for multiple audiences. It provides district assessment, school and curriculum planning, integrating technology with standards, staff development, student technology assessment, and related tools and rubrics. |
| *Getting the Most from Technology in Schools* | White, N., Ringstaff, C., and Kelley, L. | 2002 | WestEd | Report | http://www.wested.org/cs/we/view/rs/665 | Technology planning | School Educational Leaders | Policy paper on critical issues related to educational technology planning. Aimed at school educational leaders and policy makers, the paper provides an overview of research and recommendations for developing effective school or district technology plans. |
| *Connecting Kids to Technology: Challenges and Opportunities* | Wilhelm, T. Carmen, D., and Reynolds, M. | 2002 | The Annie E. Casey Foundation | Report | http://www.aecf.org/publications/data/snapshot_june2002.pdf | Research--Evaluation | Gap Analysis | Contains state-by-state data reports showing a large, persistent gap between children connected to technology and those who are not, despite the nationwide increase in computer and Internet access during the late 1990s. On the measure of home computer access to the Internet for children age 3-17, Washington State ranks 4th nationwide. |
| *Adaptive Computer Products* | | | | Web page | http://www.makoa.org/computers.htm | Assistive technology resources | Network Administrators | Listing of adaptive computer products. Useful reference for network administrators, teachers, students, and school educational leaders. |

# *APPENDIX C*

## *EDUCATIONAL TECHNOLOGY'S RELATIONSHIP TO ESSENTIAL ACADEMIC LEARNING REQUIREMENTS (EALRS) & GRADE LEVEL EXPECTATIONS (GLES)*

**[Available online at *http://www.k12.wa.us/edtech/EALR-GLE-Tech.aspx*]**

## *Washington's Essential Academic Learning Requirements (EALRs) and Their Relationship to Educational Technology*

| | | Standard | Benchmark |
|---|---|---|---|
| Arts | Grade 4 | 1. The student acquires the knowledge and skills necessary to create, to perform, and to respond effectively to the arts. | 1.1 Understand and apply arts concepts and vocabulary to communicate ideas: Identify different multimedia forms used to produce and present works of art:<br>• Graphics<br>• Photography<br>• Animation<br>• Moving image<br>• Audio<br>• Video |
| | | 3. The student uses at least one of the art forms (visual arts, music, drama, and/or dance) to communicate ideas and feelings. | 3.3 Use combinations of art forms to communicate in multimedia formats: Combine art forms using imagination and creativity to express ideas or understanding. |
| Arts | Grade 7 | 1. The student acquires the knowledge and skills necessary to create, to perform, and to respond effectively to the arts. | 1.1 Understand and apply arts concepts and vocabulary to communicate ideas: Identify different multimedia forms used to produce and present works of art:<br>• Graphics<br>• Photography<br>• Animation<br>• Moving image<br>• Audio<br>• Video |
| | | 3. The student uses at least one of the art forms (visual arts, music, drama, and/or dance) to communicate ideas and feelings. | 3.3 Use combinations of art forms to communicate in multimedia formats: Locate and acquire information from a variety of sources and organize and synthesize it in meaningful ways to communicate ideas and create artworks. |
| | | 4. The student understands how the arts connect to other subject areas, life, and work. | 4.1 Use art skills and knowledge in other subject areas: Create projects or multimedia reports that demonstrate the ability to connect the arts and other subjects. |

| | | Standard | Benchmark |
|---|---|---|---|
| Arts | Grade 10 | 1. The student acquires the knowledge and skills necessary to create, to perform, and to respond effectively to the arts. | 1.1 Understand and apply art concepts and vocabulary to communicate ideas: Identify different multimedia forms used to produce and present works of art:<br>• Graphics<br>• Photography<br>• Animation<br>• Moving image<br>• Audio<br>• Video |
| | | 3. The student uses at least one of the art forms (visual arts, music, drama, and/or dance) to communicate ideas and feelings. | 3.3 Use combinations of art forms to communicate in multimedia formats: Select and combine graphics, audio, moving images, and text, and select appropriate technologies to create, organize, and communicate ideas and feelings clearly. |
| | | 4. The student understands how the arts connect to other subject areas, life, and work. | 4.4 Recognize the influence of the arts in shaping and reflecting cultures and history: Understand how technological advances change the way cultures express and interpret meaning. |
| | | | |
| Communication | Grade 4 | 2. The student communicates ideas clearly and effectively. | 2.5 Effectively use action, sound, and/or images to support presentations: Experiment with a variety of media and resources to convey a message or enhance an oral presentation. |
| Communication | Grade 7 | 2. The student communicates ideas clearly and effectively. | 2.5 Effectively use action, sound, and/or images to support presentations: Use a variety of media to illustrate and support ideas. Use available technology as a presentation tool. |
| Communication | Grade 10 | 2. The student communicates ideas clearly and effectively. | 2.5 Effectively use action, sound, and/or images to support presentations: Communicate messages through oral, artistic, graphic, and/or multimedia presentation. Demonstrate sophisticated use of available technology to present ideas and concepts. |
| | | | |
| Health/ Fitness | Grade 10 | 3. The student analyzes and evaluates the impact of real-life influences on health. | 3.2 Gather and analyze health information: Analyze the effect of media and technology on personal and community health policy and health promotion. |
| | | | |
| Math | Grade 4 | 4. The student communicates knowledge and understanding in both everyday and mathematical language. | 4.1 Gather information: Use available technology to browse and retrieve mathematical information from a variety of sources. |

| | | Standard | Benchmark |
|---|---|---|---|
| Math | Grade 7 | 1. The student understands and applies the concepts and procedures of mathematics. | 1.1 Understand and apply concepts and procedures from number sense: Use mental arithmetic, pencil and paper, calculator, or computer as appropriate to the task involving rational numbers. |
| | | | 1.3 Understand and apply concepts and procedures from geometric sense: Use a compass and straightedge, and/or computer software to perform geometric constructions. |
| | | 4. The student communicates knowledge and understanding in both everyday and mathematical language. | 4.1 Gather information: Choose appropriate available technology to browse, select, and retrieve relevant mathematical information from a variety of sources. |
| Math | Grade 10 | 1. The student understands and applies the concepts and procedures of mathematics. | 1.3 Understand and apply concepts and procedures from geometric sense: Use a variety of tools and technologies to perform geometric constructions. |
| | | | 1.4 Understand and apply concepts and procedures from probability and statistics: Collect data using appropriate methods and technology. |
| | | 4. The student communicates knowledge and understanding in both everyday and mathematical language. | 4.1 Gather information: Integrate the use of a variety of available technologies to browse, select, and retrieve mathematical information from multiple sources. |
| | | | |
| Reading | Grade 4 | 1. The student understands and uses different skills and strategies to read. | 1.5 Use features of nonfiction text and computer software: Recognize organizational features of electronic information such as pull-down menus, key word searches, icons, etc. |
| Reading | Grade 7 | 1. The student understands and uses different skills and strategies to read. | 1.5 Use features of nonfiction text and computer software: Use organization features of electronic information (microfiche headings and numberings, CD-ROM, Internet, etc.). |
| | | 3. The student reads different materials for a variety of purposes. | 3.1 Read to learn new information: Read and comprehend a full range of texts fluently (instructions, news articles, poetry, novels, short stories, professional-level materials that match career or academic interests, electronic information, etc.). |
| Reading | Grade 10 | 1. The student understands and uses different skills and strategies to read. | 1.5 Use features of nonfiction text and computer software: Use features of electronic information (electronic bulletin boards and databases, e-mail, etc.). |
| | | | |
| Science | Grade 4 | 2. The student knows and applies the skills and processes of science and technology. | 2.2 Apply science knowledge and skills to solve problems or meet challenges: Identify problems found in familiar context in which science/technology can be or has been used to design solutions. |
| | | 3. The student understands the nature and contexts of science and technology. | 3.2 Know that science and technology are human endeavors, interrelated to each other, to society, and to the workplace: Know that science and technology have been practiced by all people throughout history. Identify the knowledge and skills of science, mathematics, and technology used in common occupations. |

| | | Standard | Benchmark |
|---|---|---|---|
| Science | Grade 7 | 2. The student knows and applies the skills and processes of science and technology.<br><br>3. The student understands the nature and contexts of science and technology. | 2.1 Develop abilities necessary to do scientific inquiry: Communicate scientific procedures, investigations, and explanations orally, in writing, with computer-based technology, and in the language of mathematics.<br><br>2.2 Apply science knowledge and skills to solve problems and meet challenges: Identify and examine common, everyday challenges or problems in which science/technology can be or has been used to design solutions.<br><br>3.2 Know that science and technology are human endeavors, interrelated to each other, to society, and to the workplace: Know that science and technology have been developed, used, and affected by many diverse individuals, cultures, and societies throughout human history. Compare and contrast scientific inquiry and technological design in terms of activities, results, and influence on individuals and society. Know that science enables technology and vice versa. Investigate the use of science, mathematics, and technology within occupational/career areas of interest. |
| Science | Grade 10 | 2. The student knows and applies the skills and processes of science and technology.<br><br>3. The student understands the nature and contexts of science and technology. | 2.1 Develop abilities necessary to do scientific inquiry: Design, conduct, and evaluate systematic and complex scientific investigations, using appropriate technology, multiple measures, and safe approaches. Use mathematics, computers and/or related technology to model the behavior of objects, events, or processes.<br><br>2.2 Apply science knowledge and skills to solve problems or meet challenges: Study and analyze challenges or problems from local, regional, national, or global contexts in which science/technology can be or has been used to design a solution.<br><br>3.2 Know that science and technology are human endeavors, interrelated to each other, to society, and to the workplace: Analyze how scientific knowledge and technological advances discovered and developed by individuals and communities in all cultures of the world contribute to changes in societies. Analyze how the scientific enterprise and technological advances influence and are influenced by human activity, for example, societal, environmental, economical, political, or ethical considerations. Investigate the scientific, mathematical, and technological knowledge, training, and experience needed for occupational/career areas of interest. |
| | | | |
| Social Studies/ History | Grade 4 | 3. The student understands the origin and impact of ideas and technological developments on history and social change. | 3.3 Understand how ideas and technological developments influence people, resources, and culture: Describe instances in which changes in values, beliefs, and attitudes have resulted from new technology such as conservation of resources or ideas about the universe. Describe how ideas and technological developments have affected people, resources, and cultures, for example, map-making, telescopes, and agricultural practices. |
| Social Studies/ History | Grade 7 | 3. The student understands the origin and impact of ideas and technological developments on history and social change. | 3.3 Understand how ideas and technological developments influence people, resources, and culture: Interpret how ideas and attitudes have been shaped by changing technologies such as the printing press, atomic energy, and genetic discoveries. Assess the impact of ideas and technological developments on society and culture, for example, railroads, power looms, and steam engines. |
| Social Studies/ History | Grade 10 | 2. The student applies the methods of social science investigation to investigate, compare and contrast interpretations of historical events.<br><br>3. The student understands the origin and impact of ideas and technological developments on history and social change. | 2.1 Investigate and research: Investigate a topic using electronic technology, library resources, and human resources from the community.<br><br>3.3 Understand how ideas and technological developments influence people, resources, and culture: Analyze and evaluate how technological developments have changed people's ideas about the natural world, such as relationship to the land, family life, and natural resources.<br>Evaluate the consequences of ideas and technological developments on the human and natural world, for example, atomic energy, penicillin, and irrigation. |

| | | Standard | Benchmark |
|---|---|---|---|
| Social Studies/ Geography | Grade 7. | 3. The student observes and analyzes the interaction between people, the environment, and culture. | 3.2 Analyze how the environment and environmental changes affect people: Examine how technology can affect people's interaction with the environment. |
| Social Studies/ Geography | Grade 10 | 3. The student observes and analyzes the interaction between people, the environment, and culture. | 3.2 Analyze how the environment and environmental changes affect people: Analyze how technological innovation may both solve environmental problems and create new ones. |
| Social Studies/ | Grade 7 | 3. The student understands the purposes and organization of international relationships and how U.S. foreign policy is made. | 3.2 Recognize factors and roles that affect the development of foreign policy: Identify factors that influence foreign policy such as trade, use of technology, and well-being of people. |
| | | | |
| Writing | Grade 4 | 3. The student understands and uses the steps of the writing process. | 3.1 Prewrite: Use available tools and technology such as a simple word processor consistently through the writing process.<br>3.5 Publish: Use technology when needed. |
| Writing | Grade 7 | 3. The student understands and uses the steps of the writing process. | 3.1 Prewrite: Use available tools and technology such as a simple word processor consistently through the writing process. Gather information from a variety of sources such as interviews, multimedia, and periodicals.<br>3.5 Publish: Use different technologies to produce a finished product. |
| Writing | Grade 10 | 3. The student understands and uses the steps of the writing process. | 3.1 Prewrite: Use available tools and technology such as a simple word processor consistently through the writing process. Analyze and synthesize information from a variety of sources such as interviews, multimedia, books, and periodicals.<br>3.4 Edit: Adapt new reference technologies to further the purpose of writing.<br>3.5 Publish: Use a variety of technological resources to produce a final product. |

# *Washington's Grade Level Expectations (GLEs) and Their Relationship to Educational Technology*

## Kindergarten

**Reading GLE 2.2.2 - Understand features of printed text and electronic sources.**
- Identify and use icons.

## Grade 1

**Math GLE 1.1.7 - Understand and apply strategies and appropriate tools for adding with whole numbers.**
- Use strategies and appropriate tools from among mental math, paper and pencil, manipulatives, or calculator to compute in a problem situation.

**Math GLE 2.2.2 - Apply mathematical tools to solve the problem with teacher guidance.**
- Use appropriate tools from among mental math, paper and pencil, manipulatives, or calculator (e.g., to determine the total number of guests attending and the total number of chairs needed for the class play).

**Reading GLE 2.2.2 - Understand and apply features of printed text and electronic sources to locate and understand information.**
- Identify and use icons, pull-down menus, and toolbars.

**Science GLE 3.2.3 - Careers and Occupations Using Science, Mathematics, and Technology: Know how knowledge and skills of science, mathematics, and technology are used in common occupations.**
- Tell at least one way that science, mathematics, or technology is used by a person in a job.

**Writing GLE 1.5.1 - Publishes own writing.**
- Illustrates work (e.g., drawings, computer graphics, collages).

## Grade 2

**Communications GLE 3.2.1 - Understands how to use available relevant media and resources in oral presentations.**
- Uses presentation technology with teacher guidance (e.g., white boards, overhead projectors).

**Math GLE 1.1.6 - Understand and apply procedures for addition and subtraction of whole numbers with fluency.**
- Solve problems involving addition and subtraction with two or three digit numbers using a calculator and explaining procedures used.

**Math GLE 1.1.7 - Understand and apply strategies and appropriate tools for adding and subtracting with whole numbers.**
- Use calculator, manipulatives, or paper and pencil to solve addition or subtraction problems.

**Math GLE 2.2.2 - Apply mathematical tools to solve the problem.**
- Use appropriate tools from among mental math, paper and pencil, manipulative, or calculator (e.g., to determine the total cost of the skating party).

**Math GLE 3.2.3 - Analyze procedures used to solve problems in familiar situations.**
- Justify the use of one mathematical tool over another (e.g., is a calculator or 100's chart a better tool in this situation?).

**Math GLE 3.3.1 - Understand how to justify results using evidence.**
- Check for reasonableness of results by using a calculator for repeated addition (e.g., to determine the total cost of the skating party).

**Reading GLE 2.2.2 - Understand and apply features of printed and electronic text to locate and comprehend text.**
- Identify and use icons and pull-down menus.

**Science GLE 3.2.1 - All Peoples Contribute to Science and Technology: Know that science and technology are practiced by all peoples around the world.**
- Identify ways that people around the world use science and technology.
- Identify ways that people around the world use science and technology to invent things and ideas.

**Writing GLE 1.5.1 - Publishes own writing.**
- Selects format for publishing (e.g., fonts, graphics, photos, colors) to enhance writing.

## Grade 3

**Communications GLE 3.1.1 - Understands how to plan for effective oral communication and presentation.**
- Uses planning tools (e.g., simple graphic organizers or drawings) to organize information in a logical sequence (e.g., describes, compares, and contrasts).

**Communications GLE 3.2.1 - Understands how to use available relevant media and resources to convey a message or enhance oral presentations.**
- Uses presentation technology with teacher guidance (e.g., visual presenters, presentation software)
- Uses reliable online sources with teacher guidance (e.g., Internet, encyclopedias).

**Health GLE/Benchmark 3.2.1a- Know reliable sources of health information.**
- Apply research skills: fact vs. myth, fiction vs. non-fiction, web-based information.

**Math GLE 1.1.6 - Apply procedures of addition and subtraction on whole numbers with fluency.**
- Use calculators to compute with large numbers (e.g., adding three or more 3-digit numbers; subtracting 3 digit from 4 digit numbers).

**Math GLE 1.1.7 - Understand and apply strategies and tools as appropriate to tasks involving addition and subtraction on whole numbers.**
- Use appropriate strategies and tools from among mental computation, estimation, calculators, and paper and pencil to compute in a problem situation.
- Use mental arithmetic, pencil and paper, or calculator as appropriate to the task involving addition and subtraction of whole numbers.

**Math GLE 1.2.4 - Understand and apply systematic procedures to measure length, time, weight, money value, and temperature.**
- Select and use tools that match the unit (e.g., ruler, clock, scales, calculator, thermometer).

**Reading GLE 2.2.2 - Apply knowledge of printed and electronic text features to locate and comprehend text.**
- Use icons, pull-down menus, key word searches.

**Science GLE 2.1.4 - Modeling: Understand how to use simple models to represent objects, events, systems, and processes.**
- Investigate phenomena using a simple physical or computer model or simulation.

**Science GLE 2.1.5 - Communicating: Understand how to report investigations and explanations of objects, events, systems, and processes.**
- Summarize an investigation by describing explanations and conclusions in written, mathematical, oral, and information technology presentation formats.

**Science GLE 2.2.2 - Limitations of Science and Technology: Understand that scientific facts are measurements and observations of phenomena in the natural world that are repeatable and/or verified by expert scientists.**

- Describe how new scientific facts are established every day (e.g., find examples of new facts in current media).

**Science GLE 3.2.1 - All Peoples Contribute to Science and Technology: Understand that science and technology have been practiced by all peoples throughout history.**

- Describe how individuals of diverse backgrounds have made significant scientific discoveries or technological advances.
- Describe how advancements in science and technology have developed over time and with contributions from diverse people.

**Science GLE 3.2.2 - Relationship of Science and Technology: Understand that people have invented tools for everyday life and for scientific investigations.**

- Describe tools (technology) invented to advance scientific investigations (e.g., thermometers, rulers, microscopes, telescopes).

**Science GLE 3.2.3 - Careers and Occupations Using Science, Mathematics, and Technology: Understand how knowledge and skills of science, mathematics, and technology are used in common occupations.**

- Identify science, math, and technology skills used in a career.
- Identify occupations using scientific, mathematical, and technological knowledge and skills.

**Writing GLE 1.1.1 - Applies at least one strategy for generating ideas and planning writing.**

- Plans intentionally with some detail using visual tools (e.g., webs, diagrams, drawings, graphic organizers).

**Writing GLE 1.5.1 - Publishes own writing.**

- Uses a variety of available technology as part of publication (e.g., software program, overhead projector, video).

# Grade 4

**Communications GLE 1.2.2 - Understands point of view and persuasion in mass media.**
- Identifies and explains examples of persuasion used in mass media (e.g., advertisements in magazines, radio, television, product displays, and pop-ups on the Internet).

**Communications GLE 3.1.1 - Understands how to plan for effective oral communication and presentation.**
- Selects material from a variety of resources (e.g., from a magazine, a video, or the Internet).
- Uses notes or other memory aids to structure presentation (e.g., prepared outline, graphic organizers).
- Uses planning tools (graphic organizers, notes, drawings) to organize information in a logical sequence using transitions (e.g., chronological order).

**Communications GLE 3.2.1 - Understands how to use available relevant media and resources to convey a message or enhance oral presentations.**
- Uses visual aids with teacher guidance. (e.g., illustrations, photos, bar graphs, line plots, tables, charts and maps).
- Uses presentation technology with teacher guidance (e.g., presentation software, digital and video cameras)
- Uses reliable online sources with teacher guidance (e.g., Internet, encyclopedias).

**Health GLE/Benchmark 3.2.1a - Know reliable sources of health information.**
- Apply research skills: fact vs. myth, fiction vs. non-fiction, web-based information.

**Math GLE 1.1.6 - Apply procedures of multiplication and division on whole numbers with fluency.**
- Use calculators to compute with large numbers (e.g., multiplying two digits times three digits; dividing three or four digits by two digits without remainders).

**Math GLE 1.1.7 - Understand and apply strategies and tools as appropriate to tasks involving multiplication and division on whole numbers.**
- Select and justify appropriate strategies and tools from among mental computation, estimation, calculators, and paper and pencil to compute in a problem situation.

**Math GLE 1.4.5 - Understand representations of data from line plots and pictographs.**
- Use technology to create pictographs.

**Math GLE 2.2.1 - Apply strategies, concepts, and procedures to devise a plan to solve the problem.**
- Determine what tools should be used to construct a solution (e.g., calculators, paper and pencil, calculator, mental math physical models such as play money).

**Math GLE 2.2.2 - Apply mathematical tools to solve the problem.**
- Use appropriate tools to solve problems (e.g., paper and pencil, calculator, or physical models, play money).

**Reading GLE 2.2.2 - Apply features of printed and electronic text to locate and comprehend text.**
- Use icons, pull-down menus, key word searches on an electronic device.

**Reading GLE 2.3.2 - Apply understanding of systems for organizing information and analyze appropriate sources.**
- Select appropriate resources for locating information (e.g., thesaurus, website, directory) on a specific topic or for a specific purpose.

**Science GLE 2.1.4 - Modeling: Understand how to use simple models to represent objects, events, systems, and processes.**
- Investigate phenomena using a simple physical or computer model or simulation.

**Science GLE 2.1.5 - Communicating: Understand how to report investigations and explanations of objects, events, systems, and processes.**
- Summarize an investigation by describing explanations and conclusions in written, mathematical, oral, and information technology presentation formats.

**Science GLE 3.1.1 - Identifying Problems: Understand problems found in ordinary situations in which scientific design can be or has been used to design solutions.**

- Describe how science and technology could be used to solve a human problem (e.g., using an electric lamp as a source of varied light for plant growth).

**Science GLE 3.2.1 - All Peoples Contribute to Science and Technology: Understand that science and technology have been practiced by all peoples throughout history.**

- Describe how individuals of diverse backgrounds have made significant scientific discoveries or technological advances.
- Describe how advancements in science and technology have developed over time and with contributions from diverse people.

**Science GLE 3.2.2 - Relationship of Science and Technology: Understand that people have invented tools for everyday life and for scientific investigations.**

- Describe how scientific tools help people design solutions to human problems (e.g., hand lens to see the detailed structure of leaves).

**Science GLE 3.2.3 - Careers and Occupations Using Science, Mathematics, and Technology: Understand how knowledge and skills of science, mathematics, and technology are used in common occupations.**

- Identify science, math, and technology skills used in a career.
- Identify occupations using scientific, mathematical, and technological knowledge and skills.

**Writing GLE 1.1.1 - Applies more than one strategy for generating ideas and planning writing.**

- Explains the difference between generating and organizing ideas and adjusts prewriting strategies accordingly (e.g., brainstorm list for generating ideas and narrowing topic, graphic organizer for organizing ideas, story boards).
- Records information or ideas at prewriting and/or drafting stages (e.g., notes, lists, free writing, webs, or graphic organizers).
- Gathers information from more than one resource and synthesizes ideas to plan writing (e.g., uses information from the internet and from books for a report).

**Writing GLE 1.4.1 - Applies understanding of editing appropriate for grade level.**

- Uses more than one resource (e.g., dictionary, writing guide, spell check, peers, adults).

**Writing GLE 1.5.1 - Publishes in more than one format for specific audiences and purposes.**

- Publishes pieces and explains choice of format, graphics, and illustrations.
- Uses a variety of available technology as part of publication (e.g., software program, overhead projector, video).

**Writing GLE 1.6.2 - Uses collaborative skills to adapt the writing process.**

- Contributes to different parts of writing process when working on a class newspaper (e.g., group plans together; partners prewrite and compose article on classroom computer; individuals illustrate and format; group revises, edits, and publishes).

# Grade 5

**Communications GLE 1.2.2 - Understands and analyzes point of view and persuasion in mass media.**

- Selects and explains examples of persuasion (e.g., band-wagon, peer pressure, testimonials/endorsements) used in mass media (e.g., advertisements in magazines, radio, television, product displays, newspaper, and advergames on the Internet).

**Communications GLE 3.1.1 - Understands how to plan for effective oral communication and presentation.**

- Uses tools (e.g., template for a simple outline, graphic organizers, notecards) to organize information in a logical sequence (e.g., in order of importance) using smooth transitions.

**Communications GLE 3.2.1 - Applies skills and strategies in using available relevant media and resources to convey a message and enhance oral presentations.**

- Uses available presentation technologies independently.
- Uses reliable online sources (e.g., Internet, encyclopedia).

**Health GLE/Benchmark 3.2.1a - Know reliable sources of health information.**

- Apply research skills: fact vs. myth, fiction vs. non-fiction, web-based information.

**Math GLE 1.1.6 - Apply procedures of addition and subtraction with fluency on non-negative decimals and like-denominator fractions.**

- Use calculators to multiply or divide with two decimal numbers in the hundredths and/or thousandths place.

**Math GLE 1.1.7 - Understand and apply strategies and tools as appropriate to tasks involving addition and subtraction of non-negative, like-denominator fractions, or decimals.**

- Select and justify strategies and appropriate tools from among mental computation, estimation, calculators, manipulatives, and paper and pencil to compute a problem situation.

**Math GLE 1.3.2 - Apply understanding of the properties of parallel and perpendicular and line symmetry to two-dimensional shapes and figures.**

- Use technology to draw figures with given characteristics.

**Reading GLE 2.2.2 - Apply understanding of printed and electronic text features to locate information and comprehend text.**

- Use organizational features and electronic sources (such as headings and numberings, CD-ROM, Internet, pull-down menus, key word searches, and icons) to access information.

**Reading GLE 3.1.1 - Analyze appropriateness of a variety of resources and use them to perform a specific task or investigate a topic.**

- Locate, select, and use a variety of library and Internet materials appropriate to a task or best suited to investigate a topic.

**Science GLE 2.1.2 - Planning and Conducting Safe Investigations: Understand how to plan and conduct simple investigations following all safety rules.**

- Generate a logical plan for, and conduct, a simple controlled investigation with appropriate materials, tools, and available computer technology.

**Science GLE 2.1.4 - Modeling: Understand how to use simple models to represent objects, events, systems, and processes.**

- Investigate phenomena using a simple physical or computer model or simulation.

**Science GLE 2.1.5 - Communicating: Understand how to report investigations and explanations of objects, events, systems, and processes.**

- Summarize an investigation by describing explanations and conclusions in written, mathematical, oral, and information technology presentation formats.

**Science GLE 3.1.1 - Identifying Problems: Understand problems found in ordinary situations in which scientific design can be or has been used to design solutions.**

- Describe how science and technology could be used to solve a human problem (e.g., using an electric lamp as a source of varied light for plant growth).

**Science GLE 3.2.1 - All Peoples Contribute to Science and Technology: Understand that science and technology have been practiced by all peoples throughout history.**

- Describe how individuals of diverse backgrounds have made significant scientific discoveries or technological advances.
- Describe how advancements in science and technology have developed over time and with contributions from diverse people.

**Science GLE 3.2.2 - Relationship of Science and Technology: Understand that people have invented tools for everyday life and for scientific investigations.**

- Describe how scientific ideas and discoveries are used to design solutions to human problems, extend human ability, or help humans adapt to different environments (e.g., prosthetics used to replace lost limbs).

**Science GLE 3.2.3 - Careers and Occupations Using Science, Mathematics, and Technology: Understand how knowledge and skills of science, mathematics, and technology are used in common occupations.**

- Identify science, math, and technology skills used in a career.
- Identify occupations using scientific, mathematical, and technological knowledge and skills.

**Writing GLE 1.1.1 - Applies more than one strategy for generating ideas and planning writing.**

- Gathers information from a range of sources, formulates questions, and uses an organizer (e.g., electronic graphic organizer, chart) to analyze and/or synthesize to plan writing.

**Writing GLE 1.2.1 - Produces multiple drafts.**

- Drafts by hand and/or on the computer.

**Writing GLE 1.3.1 - Revises text, including changes in words, sentences, paragraphs, and ideas.**

- Uses multiple resources to identify needed changes (e.g., writing guide, peers, adults, computer, thesaurus).

**Writing GLE 1.4.1 - Applies understanding of editing appropriate for grade level.**

- Uses multiple resources regularly (e.g., dictionary, peers, adults, available technology, writing guide).

**Writing GLE 1.5.1 - Publishes in more than one format for specific audiences and purposes.**

- Uses a variety of available technology as part of publication (e.g., slide show, overhead projector, publication software).

**Writing GLE 1.6.2 - Uses collaborative skills to adapt writing process.**

- Contributes to different parts of writing process when working on a class poetry book (e.g., individuals draft poem; group plans format together; individuals submit word processed poems; team edits; class publishes).

# Grade 6

**Communications GLE 1.2.2 - Analyzes bias and the use of persuasive techniques in mass media.**

- Examines and explains technique(s) used to persuade and determines the intended effect on target audience (e.g., emotional appeal – pathos appeals, fallacies, language tools).
- Examines the purpose and use of visual and auditory information in the media (e.g., automobiles, billboards, news reports, t-shirts, Internet sites).

**Communications GLE 3.2.1 - Uses available relevant technology and resources to support or enhance a presentation.**

- Uses technology to inform and/or enhance presentations (e.g., print, online resources, visual display, presentation technology, video streaming, digital and video cameras).

**Math GLE 1.1.5 - Understand the meaning of multiplication and division on non-negative rational numbers.**

- Use technology to demonstrate how multiplication and division with decimals affects place value.

**Math GLE 1.1.7 - Understand and apply strategies and tools to complete tasks involving addition and subtraction on non-negative rational numbers.**

- Select and justify the selection of appropriate strategies and tools (e.g., mental computation, estimation, calculators, and paper and pencil) to compute in a problem situation.
- Use calculators to add and subtract with decimal numbers with precision to the thousandths place and beyond.

**Math GLE 1.4.5 - Understand how to organize, display, and interpret data in text from single line graphs and scatter plots.**

- Use technology to generate bar graphs, line graphs, and scatter plots from tables of data.

**Math GLE 1.5.1 - Apply rules for number patterns based on two arithmetic operations.**

- Use technology to generate patterns based on two arithmetic operations.

**Math GLE 2.2.1 - Apply strategies, concepts, and procedures to devise a plan to solve the problem.**

- Select and apply appropriate mathematical tools for a situation (e.g., guess and check, creating tables of values [with or without technology], examine relationships between sides of a rectangle and area).

**Reading GLE 2.2.2 - Apply understanding of printed and electronic text features to locate information and comprehend text.**

- Use organizational features and electronic sources (such as headings and numberings, CD-ROM, Internet, pull-down menus, key word searches, and icons) to access information.

**Reading GLE 3.1.1 - Analyze appropriateness of a variety of resources and use them to perform a specific task or investigate a topic.**

- Locate, select, and use a variety of library, web-based, and Internet materials appropriate to the task or best suited to investigate the topic.
- Use information from various sources to investigate a topic (e.g., read newspaper want ads, websites, catalogs, yellow pages to decide which products or services to buy).

**Science GLE 2.1.2 - Planning and Conducting Safe Investigations: Understand how to plan and conduct scientific investigations.**

- Generate a logical plan for, and conduct, a scientific controlled investigation with appropriate materials, tools, and available computer technology.

**Science GLE 2.1.4 - Modeling: Analyze how models are used to investigate objects, events, systems, and processes.**

- Compare models or computer simulations of phenomena to the actual phenomena.
- Explain how models or computer simulations are used to investigate and predict the behavior of objects, events, systems, or processes.
- Create a model or computer simulation to investigate and predict the behavior of objects, events, systems, or processes (e.g., phases of the Moon using a solar system model).

**Science GLE 2.1.5 - Communicating: Apply understanding of how to report investigations and explanations of objects, events, systems, and processes.**

- Summarize an investigation by describing explanations and conclusions in written, mathematical, oral, and information technology presentation formats.

**Science GLE 3.1.1 - Identifying Problems: Analyze common problems or challenges in which scientific design can be or has been used to design solutions.**

- Describe how science and technology could be used to solve all or part of a human problem and vice versa (e.g., understanding erosion can be used to solve some flooding problems).

**Science GLE 3.2.1 - All Peoples Contribute to Science and Technology: Analyze how science and technology have been developed, used, and affected by many diverse individuals, cultures, and societies throughout human history.**

- Explain how the contributions of diverse individuals have led to the development of science and technology.

**Science GLE 3.2.3 - Careers and Occupations Using Science, Mathematics, and Technology: Analyze the use of science, mathematics, and technology within occupational/career areas of interest.**

- Examine scientific, mathematical, and technological knowledge and skills used in an occupation/career.
- Research occupations/careers that require knowledge of science, mathematics, and technology.

**Writing GLE 1.1.1 - Applies more than one strategy for generating ideas and planning writing.**

- Maintains a journal or an electronic log to collect and explore ideas; records observations, dialogue, and/or description for later use as a basis for informational or literary writing.
- Uses a variety of prewriting strategies (e.g., story mapping, listing, webbing, jotting, outlining, free writing, brainstorming).

**Writing GLE 1.2.1 - Produces multiple drafts.**

- Drafts by hand and/or on the computer.

**Writing GLE 1.4.1 - Applies understanding of editing appropriate for grade level.**

- Uses multiple resources regularly (e.g., dictionary, peers, adults, electronic spell check, writing/style guide, textbook).

**Writing GLE 1.5.1 - Publishes in a format that is appropriate for specific audiences and purposes.**

- Publishes using a range of graphics and illustrative material (e.g., photos, charts, graphs, diagrams, maps).
- Publishes material in appropriate form (e.g., slide show) and format (e.g., slide layout, color, font, keywords and phrases instead of whole sentences) for visual and dramatic presentations.
- Uses different available technologies to produce a finished product (e.g., word processor, spreadsheets, multimedia).

**Writing GLE 1.6.2 - Uses collaborative skills to adapt writing process.**

- Delegates parts of writing process to team members (e.g., during prewriting, one team member gathers Internet information while another uses the library periodicals).
- Collaborates on drafting, revising, and editing.
- Collaborates on final layout and publishing/presenting.

**Writing GLE 1.6.3 - Uses knowledge of time constraints to adjust writing process.**

- Creates a management time line, flow chart, or action plan for written projects (e.g., research paper).

**Writing GLE 2.4.1 - Produces documents used in a career setting.**

- Writes in forms associated with specific tasks or careers (e.g., application for student body office, presentation software as a visual aid).
- Selects and synthesizes information from technical and job-related documents for inclusion in writing (e.g., report that includes data/information derived from charts or graphs).

# Grade 7

**Communications GLE 3.1.1 - Applies skills to plan for effective oral communication and presentation.**

- Organizes and structures presentation to assist listener or viewer (e.g., multimedia, posing and answering a question).

**Communications GLE 3.2.1 - Uses available relevant technology and resources to support or enhance a presentation.**

- Uses technology to inform and/or enhance presentations (e.g., print, online resources, visual display, presentation technology, video streaming, digital and video cameras).

**Communications GLE 4.2.1 - Applies strategies for setting grade level appropriate goals and evaluates improvement in communication.**

- Monitors progress toward implementing the plan (e.g., through the use of audio portfolio, rubrics, reflection journals) making adjustments and corrections as needed.

**Health GLE/Benchmark 2.2.2a - Understand the concepts and factors related to communicable diseases.**

- Research and design a presentation (poster, report, pamphlet, power point, etc.) describing transmission, prevention and treatment of a variety of sexually transmitted diseases.

**Math GLE 1.1.5 - Understand the meaning of addition and subtraction on integers.**

- Use technology to demonstrate addition and subtraction with integers.

**Math GLE 1.1.7 - Understand and apply strategies and tools to complete tasks involving addition and subtraction on integers and the four basic operations on non-negative rational numbers.**

- Select and justify the selection of appropriate strategies and tools (e.g., mental computation, estimation, calculators, and paper and pencil) to compute in a problem situation.
- Convert between fractions, decimals, whole numbers, and percents mentally, on paper, or with a calculator.
- Use calculators to add and subtract with integers of two or more digits.
- Use calculators to compute with decimal numbers with precision from the thousandths place and beyond.

**Math GLE 1.3.3 - Understand the location of points on a coordinate grid in any of the four quadrants.**

- Use technology to locate objects on a two-dimensional grid.

**Math GLE 1.5.1 - Apply understanding of linear relationships to analyze patterns, sequences, and situations.**

- Use technology to generate graphic representations of linear relationships.

**Math GLE 1.5.2 - Apply understanding of linear patterns in a table, graph, or situation to develop a rule.**

- Use technology to determine the rule for a linear relationship.

**Math GLE 2.2.1 - Apply strategies, concepts, and procedures to devise a plan to solve the problem.**

- Select and apply appropriate mathematical tools for a situation (e.g., guess and check, calculate Juan's percentage and create a table of values [with or without technology] for Bonita's percentage).

**Reading GLE 2.2.2 - Apply understanding of printed and electronic text features to locate information and comprehend text.**

- Use organizational features and electronic sources (such as headings and numberings, CD-ROM, Internet, pull-down menus, key word searches, and icons) to access information.

**Reading GLE 3.1.1 - Evaluate appropriateness of a variety of resources and use them to perform a specific task or investigate a topic.**

- Select the best sources from library, web-based, and Internet materials for a specific task or to investigate a topic and defend the selection.
- Use information from various sources to investigate a topic (e.g., read newspaper want ads, websites, consumer reports, yellow pages to decide which products or services to buy).
- Follow multi-step directions (e.g., open a locker, fill out school forms, read a technical manual, design a webpage).

**Science GLE 2.1.2 - Planning and Conducting Safe Investigations: Understand how to plan and conduct scientific investigations.**

- Generate a logical plan for, and conduct, a scientific controlled investigation with appropriate materials, tools, and available computer technology.

**Science GLE 2.1.4 - Modeling: Analyze how models are used to investigate objects, events, systems, and processes.**

- Create a model or computer simulation to investigate and predict the behavior of objects, events, systems, or processes (e.g., phases of the Moon using a solar system model).

**Science GLE 2.1.5 - Communicating: Apply understanding of how to report investigations and explanations of objects, events, systems, and processes.**

- Summarize an investigation by describing explanations and conclusions in written, mathematical, oral, and information technology presentation formats.

**Science GLE 3.1.1 - Identifying Problems: Analyze common problems or challenges in which scientific design can be or has been used to design solutions.**

- Describe how science and technology could be used to solve all or part of a human problem and vice versa (e.g., understanding erosion can be used to solve some flooding problems).

**Science GLE 3.2.1 - All Peoples Contribute to Science and Technology: Analyze how science and technology have been developed, used, and affected by many diverse individuals, cultures, and societies throughout human history.**

- Explain how the contributions of diverse individuals have led to the development of science and technology.

**Science GLE 3.2.2 - Relationship of Science and Technology: Analyze scientific inquiry and scientific design and understand how science supports technological development and vice versa.**

- Describe how scientific investigations and scientific research support technology (e.g., investigation into materials led to Gortex and Kevlar).
- Describe how technology supports scientific investigations and research (e.g., microscopes led to the discovery of unicellular organisms).
- Describe how a scientifically designed solution to a human problem can lead to new tools that generate further inquiry (e.g., microscopes, telescopes, and computers).

**Science GLE 3.2.3 - Careers and Occupations Using Science, Mathematics, and Technology: Analyze the use of science, mathematics, and technology within occupational/career areas of interest.**

- Examine scientific, mathematical, and technological knowledge and skills used in an occupation/career.
- Research occupations/careers that require knowledge of science, mathematics, and technology.

**Writing GLE 1.1.1 - Analyzes and selects effective strategies for generating ideas and planning writing.**

- Generates ideas prior to organizing them and adjusts prewriting strategies accordingly (e.g., brainstorms list, then creates graphic organizer electronically).
- Uses a variety of prewriting strategies (e.g., story mapping, listing, webbing, jotting, outlining, free writing, brainstorming).
- Gathers and paraphrases information from a variety of resources (e.g., interviews, multimedia, periodicals) and chooses an organizer to analyze, synthesize, and/or evaluate information to plan writing.

**Writing GLE 1.2.1 - Analyzes task and composes multiple drafts when appropriate.**

- Drafts by hand and/or on the computer.

**Writing GLE 1.3.1 - Revises text, including changes in words, sentences, paragraphs, and ideas.**

- Uses effective revision tools or strategies (e.g., reading draft out loud, checking sentence beginnings, expanding sentences, using an electronic thesaurus).

**Writing GLE 1.4.1 - Edits for conventions.**

- Uses appropriate references and resources (e.g., dictionary, writing/style guide, electronic spelling and grammar check, conventions checklist, adults, peers).

**Writing GLE 1.5.1 - Publishes in formats that are appropriate for specific audiences and purposes.**

- Publishes using a range of graphics and illustrative material (e.g., photos, charts, graphs, tables, diagrams, cartoons).
- Publishes material in appropriate form (e.g., slide show, brochure, postcard) and format (e.g., colors, font, layout, key words and phrases instead of sentences) for visual and dramatic presentations (e.g., readers' theater script).
- Uses different available technologies to produce, design, and publish a finished product (e.g., word processor, photo software, presentation software, publishing software).

**Writing GLE 1.6.2 - Uses collaborative skills in adapting writing process.**

- Collaborates on final layout and publishing/presenting (e.g., travel brochure).

**Writing GLE 1.6.3 - Uses knowledge of time constraints to adjust writing process.**

- Creates a management time line for written projects (e.g., portfolios, research papers, ISearch papers).

**Writing GLE 2.3.1 - Uses a variety of forms/genres.**

- Integrates more than one form/genre in a single piece (e.g., a research paper about a local issue which includes caption with pictures, charts and graphs, and interviews).
- Produces a variety of new forms/genres, such as web pages.

**Writing GLE 2.4.1 - Produces documents used in a career setting.**

- Selects and synthesizes information from technical documents for inclusion in writing (e.g., report that includes data/information derived from charts or graphs).

# Grade 8

**Communications GLE 3.1.1 - Applies skills to plan for effective oral communication and presentation.**

- Determines the occasion and the audience, selects a purpose (e.g., variety show, news broadcast, science experiment, data presentation, speech, interview).

**Communications GLE 1.2.2 - Analyzes and evaluate bias and the use of persuasive techniques in mass media.**

- Examines the purpose and intended effects of visual and auditory information (e.g., news reports, commercials, Internet sites, debates).

**Health GLE/Benchmark 2.2.2a - Understand the concepts and factors related to communicable diseases.**

- Research and design a presentation (poster, report, pamphlet, PowerPoint, etc.) describing transmission, prevention and treatment of a variety of sexually transmitted diseases.

**Health GLE/Benchmark 3.2.2b - Analyze health information messages.**

- Develop a positive media campaign to promote healthy decisions.

**Math GLE 1.1.7 - Understand and apply strategies and tools to complete tasks involving computation on rational numbers.**

- Select and justify appropriate strategies and tools (e.g., mental computation, estimation, calculators, and paper and pencil) to compute in a problem situation.
- Use calculators to compute with whole number powers beyond the cubed numbers.
- Use calculators to compute square roots of perfect squares greater than 100.

**Math GLE 1.4.5 - Understand and apply data techniques to interpret bivariate data.**

- Draw trend lines with or without technology and make predictions about real-world situations (e.g., population trends, socio-economic trends).

**Math GLE 1.5.1 - Apply understanding of linear and non-linear relationships to analyze patterns, sequences, and situations.**

- Use technology to generate linear and non-linear relationship.

**Math GLE 1.5.2 - Analyze a pattern, table, graph, or situation to develop a rule.**

- Use technology to help develop a table or graph from an iterative definition (e.g., the number of cells doubles every hour starting with one cell at noon).

**Math GLE 4.2.1 - Apply organizational skills for a given purpose.**

- Design and conduct a simulation, with and without technology, to determine the probability of an event occurring.

**Reading GLE 2.2.2 - Apply understanding of complex organizational features of printed text and electronic sources.**

- Use the features of electronic information to communicate, gain information, or research a topic.

**Reading GLE 3.1.1 - Analyze web-based and other resource materials (including primary sources and secondary sources) for relevance in answering research questions.**

- Examine resource materials to determine appropriate primary sources and secondary sources to use for investigating a question, topic, or issue (e.g., encyclopedia and other reference materials, pamphlets, book excerpts, newspaper and magazine articles, letters to an editor).

**Reading GLE 3.3.1 - Understand and apply appropriate reading strategies for interpreting technical and non-technical documents used in job-related settings.**

- Use professional-level materials, including electronic information, that match career or academic interests to make decisions.

**Science GLE 2.1.2 - Planning and Conducting Safe Investigations: Understand how to plan and conduct scientific investigations.**

- Generate a logical plan for, and conduct, a scientific controlled investigation with appropriate materials, tools, and available computer technology.

**Science GLE 2.1.4 - Modeling: Analyze how models are used to investigate objects, events, systems, and processes.**

- Create a model or computer simulation to investigate and predict the behavior of objects, events, systems, or processes (e.g., phases of the Moon using a solar system model).

**Science GLE 2.1.5 - Communicating: Apply understanding of how to report investigations and explanations of objects, events, systems, and processes.**

- Summarize an investigation by describing explanations and conclusions in written, mathematical, oral, and information technology presentation formats.

**Science GLE 3.1.1 - Identifying Problems: Analyze common problems or challenges in which scientific design can be or has been used to design solutions.**

- Describe how science and technology could be used to solve all or part of a human problem and vice versa (e.g., understanding erosion can be used to solve some flooding problems).

**Science GLE 3.2.1 - All Peoples Contribute to Science and Technology: Analyze how science and technology have been developed, used, and affected by many diverse individuals, cultures, and societies throughout human history.**

- Explain how the contributions of diverse individuals have led to the development of science and technology.
- Explain how science and technology have affected individuals, cultures, and societies throughout human history.

**Science GLE 3.2.2 - Relationship of Science and Technology: Analyze scientific inquiry and scientific design and understand how science supports technological development and vice versa.**

- Describe how scientific investigations and scientific research support technology (e.g., investigation into materials led to Gortex and Kevlar).
- Describe how technology supports scientific investigations and research (e.g., microscopes led to the discovery of unicellular organisms).
- Describe how a scientifically designed solution to a human problem can lead to new tools that generate further inquiry (e.g., microscopes, telescopes, and computers).

**Science GLE 3.2.3 - Careers and Occupations Using Science, Mathematics, and Technology: Analyze the use of science, mathematics, and technology within occupational/career areas of interest.**

- Examine scientific, mathematical, and technological knowledge and skills used in an occupation/career.
- Research occupations/careers that require knowledge of science, mathematics, and technology.

**Writing GLE 1.1.1 - Analyzes and selects effective strategies for generating ideas and planning writing.**

- Generates ideas prior to organizing them and adjusts prewriting strategies accordingly (e.g., free write, outline, list, T-chart for comparing).
- Maintains a log or journal (electronic or handwritten) to collect and explore ideas; records observations, dialogue, and/or description for later use as a basis for informational, persuasive, or literary writing.
- Gathers information (e.g., takes notes) from a variety of sources (e.g., Internet, interviews, multimedia, books, periodicals) and chooses an organizer to analyze, synthesize, and evaluate information to plan writing.

**Writing GLE 1.2.1 - Analyzes task and composes multiple drafts when appropriate.**

- Drafts by hand and/or on the computer.

**Writing GLE 1.3.1 - Revises text, including changes in words, sentences, paragraphs, and ideas.**

- Selects and uses effective revision tools or strategies based on project (e.g., referring to prewriting, checking sentence beginnings, combining sentences, using "cut and paste" word processing functions).
- Revises typographic devices (e.g., bullets, numbered lists) to clarify text and to meet requirements of technical writing forms (e.g., lab reports, graphs).
- Uses multiple resources to improve text (e.g., writing guides, assignment criteria, peers, adults, electronic thesaurus).

**Writing GLE 1.4.1 - Edits for conventions.**

- Uses appropriate references and resources (e.g., dictionary, writing/style guides, electronic spelling and grammar check, adults, peers).

**Writing GLE 1.5.1 - Publishes in formats that are appropriate for specific audiences and purposes.**

- Selects from a variety of publishing options keeping in mind audience and purpose (e.g., e-portfolio, newsletters, contests, school announcements, yearbook).
- Publishes using a range of graphics and illustrative material (e.g., photos, charts, graphs, tables, time lines, diagrams, cartoons).
- Publishes material in appropriate form (e.g., multimedia presentation) and format (e.g., photos, graphs, text features).
- Uses available technological resources to produce, design, and publish a professional looking final product (e.g., charts, overheads, word processor, photo software, presentation software, publishing software).

**Writing GLE 1.6.2 - Uses collaborative skills to adapt writing process.**

- Delegates parts of process to team members (e.g., one team member publishes, one edits, another presents).
- Collaborates on drafting, revising, and editing.
- Collaborates on final layout and publishing/presenting (e.g., presentation with slideshow).

**Writing GLE 1.6.3 - Uses knowledge of time constraints to adjust writing process.**

- Creates a management time line/flow chart for multi-week written projects (e.g., portfolios, research papers, I-Search papers).

**Writing GLE 2.3.1 - Uses a variety of forms/genres.**

- Produces a variety of new forms/genres, such as zines.

**Writing GLE 2.4.1 - Produces documents used in a career setting.**

- Selects and synthesizes information from technical and career documents for inclusion in writing (e.g., lab report that includes data recorded on graphs).

# Grades 9-10

**Communications GLE 1.2.2 - Evaluates the effect of bias and persuasive techniques in mass media.**

- Compares how different perspectives interpret the same media text (e.g., different newspapers, radio/television stations, Internet sites).

**Communications GLE 4.2.1 - Applies strategies for setting grade level appropriate goals and evaluates improvement in communication.**

- Monitors progress through the use of a variety of tools (e.g., portfolios, logs, rubrics, reflection journals, or video portfolio) and makes adjustments as needed.

**Math GLE 1.1.1 - Understand and apply scientific notation.**

- Read and translate numbers represented in scientific notation from calculators and other technology, tables, and charts.

**Math GLE 1.1.7 - Understand and apply strategies and appropriate tools for adding with whole numbers.**

- Use strategies and appropriate tools from among mental math, paper and pencil, manipulatives, or calculator to compute in a problem situation.

**Math GLE 1.3.1 - Understand the relationship among characteristics of one-dimensional, two-dimensional, and three-dimensional figures.**

- Make and test conjectures about two-dimensional and three-dimensional shapes and their individual attributes and relationships using physical, symbolic, and technological models (e.g., diagonal of a rectangle or prism is the longest interior segment; what figures make up cross-sections of a given three-dimensional shape).

**Math GLE 1.3.2 - Apply understanding of geometric properties and relationships.**

- Construct geometric figures using a variety of tools and technologies (e.g., angle bisectors, perpendicular bisectors, triangles given specific characteristics).
- Use technology to generate two and three dimensional models of geometric figures with given geometric characteristics (e.g., generate a two-dimensional animation using pentagons with fixed coordinates for one edge).

**Math GLE 1.3.3 - Apply understanding of geometric properties and location of points to figures.**

- Use tools and technology to draw objects on a coordinate grid based on given conditions.
- Identify, interpret, and use the meaning of slope of a line as a rate of change using physical, symbolic, and technological models.

**Math GLE 1.3.4 - Apply understanding of multiple transformations.**

- Create a design with or without technology using a combination of two or more transformations with one or two two-dimensional figures.
- Use technology to create two- and three-dimensional animations using combinations of transformations.

**Math GLE 1.4.2 - Apply understanding of dependent and independent events to calculate probabilities.**

- Explain the relationship between theoretical probability and empirical frequency of dependent events using simulations with and without technology.

**Math GLE 1.4.3 - Apply appropriate methods and technology to collect data or evaluate methods used by others for a given research questions.**

- Evaluate methods and technology used to investigate a research question.
- Use technology appropriately to collect data.

**Math GLE 1.4.4 - Understand and apply techniques to find the equation for a reasonable linear model.**

- Use technology to determine the line of best fit for a set of data.

**Math GLE 1.4.5 - Analyze a linear model to judge its appropriateness for a data set.**

- Use technology to generate data to fit a linear model.

**Math GLE 2.2.1 - Apply strategies, concepts, and procedures to devise a plan to solve the problem.**

- Select and apply appropriate mathematical tools to devise a strategy in a situation (e.g., if the data, in either tabular or graphical form, suggest a linear relationship, plan to find a linear equation for each set of data; solve those equations simultaneously [or use technology to find the intersection of the two lines] to answer the question). If the data pattern suggests a non-linear model, plan to project what the pattern is and extend that pattern.

**Math GLE 2.2.2 - Apply mathematical tools to solve the problem.**

- Implement the plan devised to solve the problem (e.g., solve the set of simultaneous equations to arrive at a time where the two times are the same).
- Use mathematics to solve the problem (e.g., use algebra to write equations for the two linear models, solve the system of equations using either symbols or technology).

**Math GLE 3.2.1 - Apply skill of conjecturing and analyze conjectures by formulating a proof or constructing a counter example.**

- Make and test conjectures about two-dimensional and three-dimensional figures and their individual attributes and relationships using physical, symbolic, and technological models (e.g., diagonal of a rectangle or prism is the longest interior segment; what figures make up cross-sections of a given three-dimensional shape).

**Math GLE 4.2.2 - Understand how to express ideas and situations using mathematical language and notation.**

- Explain the relationship between theoretical probability and empirical frequency of dependent events using simulations with and without technology.

**Math GLE 5.1.2 - Understand how use different mathematical models and representations in the same situation.**

- Identify, interpret, and use the meaning of slope of a line as a rate of change using concrete, symbolic, and technological models.
- Construct one-dimensional, two-dimensional, and three-dimensional geometric figures using a variety of tools and technologies (e.g., angle bisectors, perpendicular bisectors, triangles given specific characteristics).

**Reading GLE 2.2.2 - Apply understanding of complex organizational features of printed text and electronic sources.**

- Use the features of electronic information to communicate, gain information, or research a topic.

**Reading GLE 2.3.2 - Evaluate informational materials, including electronic sources, for effectiveness.**

- Judge the usefulness of information based on relevance to purpose, source, objectivity, copyright date, cultural and world perspective (e.g., editorials), and support the decision.

**Reading GLE 3.1.1 - Analyze web-based and other resource materials (including primary sources and secondary sources) for relevance in answering research questions.**

- Examine materials to determine appropriate primary sources and secondary sources to use for investigating a question, topic, or issue (e.g., encyclopedia and other reference materials, pamphlets, book excerpts, newspaper and magazine articles, letters to an editor, oral records, research summaries, scientific and trade journals).

**Reading GLE 3.3.1 - Apply appropriate reading strategies for interpreting technical and non-technical documents used in job-related settings.**

- Read professional-level materials, including electronic information, that match career or academic interests and demonstrate understanding of the content.
- Select and use appropriate skills for reading a variety of documents (e.g., tables, blueprints, electronic technology manuals, bills of lading, medical charts, mechanical manuals).

**Science GLE 2.1.2 - Planning and Conducting Safe Investigations: Understand how to plan and conduct systematic and complex scientific investigations.**

- Generate a logical plan for, and conduct, a systematic and complex scientific controlled investigation with appropriate materials, tools, and available computer technology.

**Science GLE 2.1.4 - Modeling: Analyze how physical, conceptual, and mathematical models represent and are used to investigate objects, events, systems, and processes.**

- Compare how a model or different models represent the actual behavior of an object, event, system, or process.
- Evaluate how well a model describes or predicts the behavior of an object, event, system, or process.
- Create a physical, conceptual, and/or mathematical (computer simulation) model to investigate, predict, and explain the behavior of objects, events, systems, or processes (e.g., DNA replication).

**Science GLE 2.1.5 - Communicating: Apply understanding of how to report complex scientific investigations and explanations of objects, events, systems, and processes and how to evaluate scientific reports.**

- Summarize an investigation by describing explanations and conclusions in written, mathematical, oral, and information technology presentation formats.

**Science GLE 2.2.5 - Evolution of Scientific Ideas: Understand how scientific knowledge evolves.**

- Explain how existing ideas were synthesized from a long, rich history of scientific explanations and how technological advancements changed scientific theories.

**Science GLE 3.1.1 - Identifying Problems: Analyze local, regional, national, or global problems or challenges in which scientific design can be or has been used to design a solution.**

- Explain how science and technology could be used to solve all or part of a human problem and vice versa (e.g., understanding the composition of an Earth material can be useful to humans, such as copper ore being used to make copper wire).
- Describe a change that could improve a tool or a technology.

**Science GLE 3.2.1 - All Peoples Contribute to Science and Technology: Analyze how scientific knowledge and technological advances discovered and developed by individuals and communities in all cultures of the world contribute to changes in societies.**

- (9) Explain how life has changed throughout history because of scientific knowledge and technological advances from a variety of peoples.
- (10) Compare the impacts of diverse cultures and individuals on science and technology.

**Science GLE 3.2.2 - Relationship of Science and Technology: Analyze how the scientific enterprise and technological advances influence and are influenced by human activity.**

- Describe how science and/or technology have led to a given social or economic development.
- (10) Compare advantages and/or disadvantages of using new technology or science in terms of ethics, politics, and environmental considerations.

**Science GLE 3.2.3 - Careers and Occupations Using Science, Mathematics, and Technology: Analyze the scientific, mathematical, and technological knowledge, training, and experience needed for occupational/career areas of interest.**

- Research and report on educational requirements associated with an occupation(s)/career(s) of interest.
- Examine the scientific, mathematical, and technological knowledge, training, and experience needed for occupational/career areas of interest.

**Writing GLE 1.1.1 - Analyzes and selects effective strategies for generating ideas and planning writing.**

- Gathers, analyzes, synthesizes, and organizes information from a variety of sources (e.g., interviews, websites, books, field notes).
- Maintains a log or journal (electronic or handwritten) to collect and explore ideas; records observations, dialogue, and/or description for later use as a basis for informational, persuasive, or literary writing.

**Writing GLE 1.2.1 - Analyzes task and composes multiple drafts when appropriate.**

- Drafts by hand and/or on the computer.

**Writing GLE 1.3.1 - Revises text, including changes in words, sentences, paragraphs, and ideas.**

- Selects and uses effective revision tools or strategies based on project (e.g., sentence analysis form, revision criteria checklist, “find-and- replace” or “track changes” functions of word processing program).
- Revises typographical devices (e.g., bullets, numbered lists) to clarify text and to meet requirements of technical and content-area writing forms (e.g., resumé, business letter).
- Uses multiple resources to improve text (e.g., writing guides, assignment criteria, internet grammar guide, peers, thesaurus, dictionary).

**Writing GLE 1.4.1 - Edits for conventions.**
- Uses appropriate references and resources (e.g., dictionary, writing/style guides, electronic spelling and grammar check, adults, peers).

**Writing GLE 1.5.1 - Publishes in formats that are appropriate for specific audiences and purposes.**
- Selects from a variety of publishing options keeping in mind audience and purpose (e.g., website, literary magazines, blogs, local newspaper).
- Publishes using a range of graphics and illustrative material (e.g., time lines, flow charts, political cartoons, diagrams).
- Publishes material in appropriate form (e.g., films, multimedia demonstrations, culminating project) and format (e.g., credits in film, font size, section breaks in longer document).
- Uses a variety of available technological resources (e.g., charts, overheads, word processor, photo software, presentation software) to produce, design, and publish a professional-looking final product.

**Writing GLE 1.6.2 - Uses collaborative skills to adapt writing process.**
- Collaborates on drafting, revising, and editing.
- Collaborates on final layout and publishing/presenting (e.g., yearbook, literary magazine).

**Writing GLE 1.6.3 - Uses knowledge of time constraints to adjust writing process.**
- Creates a management time line/flow chart for written projects (e.g., Thirteenth-Year Plan, exit project, oral histories).

**Writing GLE 2.3.1 - Uses a variety of forms/genres.**
- Produces a variety of new forms/genres, such as blogs.

**Writing GLE 2.4.1 - Produces documents used in a career setting.**
- Produces technical and nontechnical documents for career audiences (e.g., proposal, resumé, abstract) taking into consideration technical formats (e.g., bullets, numbering, subheadings, blank space).
- Selects and synthesizes information from technical and career documents for inclusion in writing (e.g., High School and Beyond Plan that includes information summarized from online vocational source or other informational text).

# *APPENDIX D*
# *1994 & 2002 TECHNOLOGY PLAN RECOMMENDATIONS*

## *1994 Technology Plan Recommendations*[1]

### *BRIDGING THE GAPS:*

Legislative Recommendations

Washington State has made great strides in education technology through both state level and local initiatives. These recommendations are proposed as interdependent components of a comprehensive plan which will result in increased educational benefits for all K-12 students.

The strategies employed support the common belief that significant systemic change can and must happen at the local level, but only through a combination of state leadership, alliances among all stakeholders, local empowerment, adequate resources and commitment through ongoing staff development, strategic planning and implementation.

*Bridging Leadership Gaps*

*Recommendation #1: Integration of Technology into Educational Initiatives*

It is recommended that the OSPI, the Commission on Student Learning, the school-to-work initiatives and the Goals 2000 Committee consider technological implications and opportunities as this state's new education system is established. Furthermore, that the statewide Education Technology Advisory Committee (ETAC) serve in an advisory capacity in all matters pertaining to educational technology and information policymaking in K-12 for those groups; and that ETAC serve as an advocate for education in the telecommunications regulatory process. [1995-97: $49,000]

*Recommendation #2: Partnerships, Alliances and Public Awareness*

It is recommended that the Legislature fund OSPI to launch alliances, partnerships and public awareness initiatives which gain broad-based public and private understanding, and support and funding for the integration of technology and telecommunications in K-12 education. [1995-97: $600,000]

*Recommendation #3: Affordable Telecommunications Access for Schools*

It is recommended that the state assist K-12 school districts in securing affordable access to telecommunications services and equipment through: aggregated purchasing; establishment of K-12 education as a market through education and advocacy; support for education/community/business partnerships which prototype leveraging of resources; establishment of tax incentives for the high-tech industry to assist schools in securing affordable access; and legislative action to ensure K-12 access to channel capacity and production support through existing cable systems. [1995-97: $2,619,900]

*Recommendation #4: State Policies and Funding Strategies Which Reflect Schools' Technology Requirements*

It is recommended that all development, adoption and/or revision of policies and procedures for the common school system by the State Legislature, the State Board of Education, the Commission on Student Learning and OSPI reflect current technological requirements for learning. [1995-97 biennium: $0]

*Recommendation #5: Levy and Bond Regulations Which Reflect Schools' Technology Requirements*

It is recommended that the State Legislature enact legislation to revise current constitutional and statutory language regarding bonds and levies to give school districts increased flexibility to effectively deploy, operate, upgrade and maintain technology and telecommunications in the K-12 education system. [1995-97 biennium: $0]

*Bridging Resource Gaps*

*Recommendation #6: State Allocation to Districts for Technology*

It is recommended that the Legislature establish and fund an ongoing technology grant program through OSPI to grant funds to school districts to equitably support all students' learning through technology and telecommunications. Prior to receiving such grants, school districts would be required to develop, implement and assess technology plans focused on student learning. [1995-97: $100,089,690]

*Recommendation #7: Regional Support for Educational Professionals*

It is recommended that the Legislature increase funding to OSPI and the Educational Technology Support Center program in the ESDs to:

- expand services in networking to meet current demand, and
- work with institutions of higher education and the Commission on Student Learning in developing and implementing new staff development models which support new education reform initiatives. [1995-97: $1,457,000]

*Recommendation #8: Enhancing K-12 Education's Statewide Electronic Network*

It is recommended that the Legislature appropriate funds to OSPI for the enhancement, extension and continued operation of a state backbone (leveraging off all existing educational and governmental systems where possible) for the K-12 common schools across the state. And, furthermore, to connect schools to other learning resources such as public libraries, community and technical colleges and institutions of higher education. [1995-97: $2,148,100]

*Recommendation #9: Providing Electronic Destinations*

It is recommended that the Legislature appropriate funds to OSPI to support the conversion of data (text, video, audio, imagery, etc.) into electronic form to be made available to Washington K-12 learners at reduced rates. Priority will be given to in-state entities (e.g., universities, libraries, classrooms, museums, resource agencies). It is further recommended that the state secure rights to curricular resources deemed necessary by school districts (e.g., electronic access to an atlas, encyclopedias, archival series of images on the Holocaust, Civil Rights video images, etc.). [1995-97 biennium: $550,000]

*Bridging Implementation Gaps:*

*Recommendation #10: Integrating Technology into the Curriculum*

It is recommended that the Legislature appropriate funds to OSPI to develop, implement and assess technology-based curriculum projects which support Washington State's educational reform in cooperation with school districts, educational service districts, the Commission on Student Learning, the Center for the Improvement of Student Learning and higher education institutions. [1995-97 biennium: $996,570]

*Recommendation #11: Technology in Teacher Preparation Programs*

It is recommended that the Legislature appropriate funds to OSPI to pilot new models of training for prospective teachers, incorporating new technology-based instructional strategies and strong linkages between K-12 schools and state-approved teacher preparation programs. The pilots would be in partnership with the State Board of Education, the Higher Education Coordinating Board, the State Board for Community and Technical Colleges and institutions of higher education. It is further recommended that the State Board of Education and OSPI, with advisement from the Professional Education Advisory Committee (PEAC), incorporate technology in the current study on performance-based teacher certification. [1995-97: $646,100]

*Recommendation #12: Information Policies*

It is recommended that school boards review current policies to ensure that they appropriately address policy issues related to technology and telecommunications. And, that the Legislature provide funds to OSPI to coordinate the development and dissemination of model information policies related to technology and telecommunications for local school boards. Policy issues include: intellectual freedom, acceptable use of telecommunications services, privacy, security and confidentiality of data, etc. [1995-97: $150,000]

# *2002 Technology Plan Recommendations*[2]

| Recommendation | Short Description |
|---|---|
| ***STANDARDS AND PROFESSIONAL DEVELOPMENT*** | |
| **Teacher, Paraprofessional, and Educational Leader Technology Standards and Professional Development** | The State Board of Education should adopt educational technology proficiency standards for all teachers, paraprofessionals, and educational leaders. The Legislature should provide professional development support to assist teachers, paraprofessionals, and educational leaders in meeting the new standards. |
| **Pre-Service Educational Technology Training** | The State Board of Education and the Superintendent of Public Instruction should develop pre-service educational technology training requirements for teacher pre-service programs and administration certification programs, including alternative certification programs. The Legislature should provide funding to support districts in hiring staff who are highly qualified in educational technology based on their training and certification. |
| **Student "Technology Literacy" Standards** | The Superintendent of Public Instruction, with the support of the Legislature and school districts, should begin developing educational technology essential learning requirements, define "technology literacy" in this process, and develop student performance assessments consistent with the educational technology learning requirements. The state should provide sufficient funding to conduct this process with the full involvement of the educational community, parents, students, and other stakeholders. |
| ***FISCAL POLICY AND STRATEGIC FUNDING*** | |
| **Flexibility in Bonds and Levies** | The Legislature should provide school districts with more flexibility in how local levies and bonds funds may be spent. Schools should be encouraged to account for ongoing maintenance and depreciation of computers, and to explore leasing equipment when appropriate. |
| **State Educational Technology Funding/ Revolving Fund** | The Legislature should create a dedicated revolving fund for educational technology hardware, software, professional development, and content acquisition.<br><br>The Legislature should allocate educational technology funding to districts based on a FTE student formula, with specific funding earmarked toward professional development. |
| **Enhanced Educational Technology Support** | The Legislature should develop network staffing ratios and a supporting salary schedule to improve the ratio and funding of network administrators and technical support in school buildings. |

| ***LEARNING AND TEACHING SUPPORT*** | |
|---|---|
| **Enhanced K-20 Educational Telecommunications Network** | The Legislature should maintain the current funding level to ensure equitable access to the K-20 Educational Telecommunications Network for all K-12 districts, and maintain and expand technical support and training for K-12 districts in their use of the K-20 Network. |
| **Targeted Support for Needy Schools** | The Legislature should provide targeted support to assist needy schools with connectivity or other specific needs articulated in an approved district technology plan. |
| **Digital Educational Content** | The Legislature should support the state in developing and providing digital educational content (new and through current partnerships) that is comprehensive, current, and culturally appropriate. |
| **Best Practices in Educational Technology** | The Superintendent of Public Instruction, with assistance from the Legislature and school districts, should identify, promote, and fund proven educational technology practices, professional development strategies, and classroom modeling in educational technology. |
| **Community Engagement Through Educational Technology** | The state should assist school districts in creating community connections with grant funding and technical assistance in:<br><br>(1) Providing after-school access to computers (leveraging existing technology resources).<br><br>(2) Using online resources to showcase student work, communicate with parents and guardians about student progress, and encourage collaboration.<br><br>(3) Providing links to internal or external venues that allow students who are highly skilled technologically to pursue career preparation. |
| **Statewide Data-Driven Decision Making System** | The Legislature should fund the creation of a statewide data management system that will collect longitudinal data at the student level. This system will permit the state to have access to clean, reliable, and accurate data to run statistical inferences and perform research analysis. Key elements should include a mechanism for classroom teachers to access classroom grades, attendance, lesson plans, and other curriculum, instruction, and assessment tools based on best practices. The system should also allow classroom teachers and staff to assess student performance across schools (track mobility, prior academic achievement, and other student characteristics related to their academic achievement). |

# *Endnotes*

[1] Office of Superintendent of Public Instruction (OSPI) (1994). *Report to the Legislature on the Washington State technology Plan for the K-12 Common School System.* Olympia, WA.

[2] Office of Superintendent of Public Instruction (OSPI) (2002), *Washington State Educational Technology Plan: A Blueprint for Washington's K-12 Common Schools and Learning Communities*. Olympia, WA.

# *APPENDIX E*

# *Educational Technology Initiatives*

This section describes educational technology initiatives in Washington State, including:

- Learning and teaching initiatives with educational technology.
- Professional development initiatives to support the effective integration of educational technology into learning and teaching.
- Networking and connectivity initiatives.
- Statewide support for educational technology in Washington State's education reform efforts.

Initiatives within each major category are listed alphabetically. There is a wide range of projects in terms of sponsorship (public, private, or combination), program content, applications, targeted populations (e.g., assistive technology), and overall scope (total number of participating schools and students). Additional information for each initiative such as sponsoring organization, Internet address, and specific activities is provided in Appendix B.

## *LEARNING AND TEACHING INITIATIVES*

This section provides an overview of learning and teaching initiatives using educational technology.

Assistive Technology Projects

*SRVOP Project*

The Shared Reading Video Outreach Project (SRVOP) is an adaptation of the Shared Reading Project developed by David R. Schleper of Gallaudet University's Clerc Center. SRVOP uses K-20 videoconferencing systems located in local school districts and educational service districts to offer a reading enhancement program to deaf children, their families, and educators. For the first time, isolated deaf children living in remote areas—as well as their parents, other family members, and teachers—can see, interact with, and learn from skilled deaf adults and from other deaf children.

This program originates at Puget Sound Educational Service District (PSESD), located near Seattle. Supplemental training and discussion groups for educational staff, provided via live interactive videoconferencing, are facilitated by a mentor teacher of the deaf throughout the year.

*Technology & Learning Disabilities Project*

This Title II, Part D, competitive grant project works with 6th through 12th grade special education teachers to help improve teaching practices in reading, writing, and mathematics using assistive technologies. The project is directed by the Special Education Technology Center (SETC) at Central Washington University.

Digital Learning Commons

The Digital Learning Commons (DLC) is a nonprofit organization established to improve access to educational opportunities and learning resources by providing high-quality educational materials, online courses, and technology tools for Washington's students, teachers, and parents. The DLC was launched in 2002 with support from the Washington State Legislature, the Bill & Melinda Gates Foundation, the Paul G. Allen Family Foundation, and the William and Flora Hewlett Foundation. After successfully completing its proof-of-concept phase, which served 65 schools and more than 35,000 users over the course of two years, the DLC is now in its implementation phase.

The DLC offers the following resources:

- Online courses in core content areas, AP and college courses, enrichment and elective courses, foreign language courses, and vocational courses;
- A digital resource library made up of five subscription databases and time-saving links to relevant resources;
- College and career planning materials;
- Instructional support tools; and
- Digital tools, including portfolio management, discussion board, peer review, and survey creation.

Generation YES Project

The foundation for Generation YES is the extensive involvement of students as collaborative partners with their teachers, their school, their school district, and the local community to assist in restructuring education through instructional and telecommunications technologies. Generation YES originated in 1996 in the Olympia School District as a U.S. Department of Education Technology Innovation Challenge Grant (TICG). During the five-year grant cycle, 151 Washington State schools used the model. When grant funding ended in 2001, Generation YES (Youth and Educators Succeeding) was established to develop and deliver "revolutionary curriculum that helps schools effectively use technology."

## High Tech Learning Centers

Located in each of the nine NEVAC school districts, the High Tech Learning Centers (HTLCs) deliver state-of-the-art Information Technology (IT) education to high school students that leads to industry certification and/or accelerated placement in higher education, creating a skilled IT workforce in the most productive way. By building a college transcript in high school, the HTLCs not only increase the supply of high-tech students, they also reduce the time and expense of achieving a post-secondary Information technology (IT) certificate or degree. Over 10,000 students have taken HTLCs classes and many more are registered to take advantage of the wide variety of high tech class offerings in the areas of Programming, Networking, Animation, Web Authoring, and Multimedia. In addition to face-to-face courses, students also have access to four cutting-edge distance learning courses.

## MarcoPolo Online Resources

MarcoPolo provides no-cost, standards-based Internet content developed by the nation's content experts for the K-12 teacher and classroom. Resources found on the MarcoPolo Web site and the six partner Web sites offer teachers educational resources that have been aligned to Washington State curriculum standards. In Washington State, the Educational Technology Support Center (ETSC) Program is leading this effort in cooperation with OSPI and the nine ESDs.

## Network Learning Communities Project

This Title II, Part D, competitive grant project works with teams of teachers in grades 5-9 to improve teaching practices in mathematics using technological tools and other research-based methodologies. Much of the instruction and professional development is delivered online, after initial face-to-face meetings. Authentic activities using eCoach, an online classroom tool, is also provided to a cadre of math teachers in the building.

## NO LIMIT Project

The NO LIMIT (New Outcomes: Learning Improvement in Mathematics Integrating Technology) Project is funded through the Enhancing Education Through Technology federal grant program. The grant is focused on developing classroom models where students are using standards-based learning to improve their achievement of math skills. Teams of middle school teachers strive to improve teaching practices in mathematics through the integration of technology and other research-based methodologies.

## Online Buying Cooperatives

The ETSC Program (described further below) and the nine Educational Service Districts (ESDs) have made the following agreements available for K-12 schools in the state of Washington to purchase these products at reduced prices:

- WebEd - A national provider of online professional development for K-12 teachers; offers online courses authored by leading education professionals.
- NovaNET - An agreement allowing schools to purchase an online library of interactive curricula for middle and high school students.

## Online Courses

OSPI conducts an annual survey of school district technology availability and use, including student enrollment in online courses. Some of the recent findings include:[1]

- During 2004-2005, approximately 10,164 K-12 students were enrolled in online courses for credit.
- The most common reasons reported for taking online curriculum courses are better meeting the needs of each student, access to classes otherwise unavailable, and reaching home schoolers and students who need to re-take courses; cost savings for the school is the least commonly-reported reason.
- Student motivation, quality instructional materials, and access to technology during the school day are the three items cited most often as contributors to successful online experiences for students.

## Online Schools in Washington

Several online schools are already operating in Washington, with several more under development. Current schools include:

- Federal Way Internet Academy (http://www.iacademy.org/).
- Evergreen Internet Academy in Vancouver (http://eia.egreen.wednet.edu/).
- Christa McAuliffe Academy in Yakima (http://www.cmacademy.org/).

The oldest of these online schools is the Federal Way Internet Academy, which provides online K-12 core courses to an enrollment of over 1200 students in 102 school districts throughout Washington, as well as several other states and countries. The Internet Academy's faculty, who are Federal Way School District employees, primarily develop and teach the courses.

ProQuest Online Database

ProQuest provides online access to over 3,000 magazines titles and five Washington newspapers plus the New York Times. Schools can choose from several databases including eLibrary Elementary, JuniorQuest (junior high), Platinum (senior high) and Discovery (faculty).

SHARE Project

SHARE is a project involving 22 Central Washington school districts, 63 other school districts around the state, 1100+ teachers, 15,000+ students and the ETSC Program. Each classroom educator is involved in: www-based communication with parents/guardians/students through a classroom website, calendar, newsletter and syllabus; guided online student research; online collaborations with educators, the creation, development and publication of student-researched projects, developing and sharing project-based curriculum online; and facilitating structured student feedback on other student projects. Participating educators from all grade levels and subject areas are involved.

UW Distance Learning Courses

The University of Washington is the largest public university provider of distance education in North America, enrolling more than 10,000 students last year in 12 degrees, 25 certificate programs, and more than 300 credit and noncredit courses in various distance learning formats, mostly online. The current onsite "UW in the High School" program offers high school students the opportunity to earn college credits in world languages, English, mathematics, and geology and can be extended to the online environment.

Washington State LASER

Washington State Leadership and Assistance for Science Education Reform (LASER) is a K-8 science education reform initiative designed to increase the numbers of Washington students participating in quality science education programs. Working collaboratively with more than 80 school districts across the state, Washington LASER is helping these districts initiate, implement and sustain inquiry-centered science education programs.

## *PROFESSIONAL DEVELOPMENT TO SUPPORT TECHNOLOGY INTEGRATION INTO CURRICULUM AND INSTRUCTION*

This section provides an overview of initiatives primarily focused on teacher professional development in the use of educational technology.

### ETSC Program

The Educational Technology Support Center (ETSC) Program is state-funded in support of education reform to:

- Improve technology infrastructure.
- Monitor and report on school district technology development.
- Promote standards for school district technology.
- Promote statewide coordination and planning for technology development.
- Provide regional educational technology support centers, including state support activities.
- Assist school districts in the evaluation and provision of online curriculum products.

### PILOT Tool

The PILOT (Prepare to Integrate Learning with Technology) tool is the result of a collaborative effort among the Educational Technology Support Centers. The site serves many purposes: It is an online, self-assessment tool (aligned to the ISTE National Educational Technology Standards) for educators to determine their levels of technology proficiency and classroom application. Based upon the results of the assessment, it is a place for educators to view and select learning opportunities throughout the state to advance their proficiency level. In addition, charts can be displayed showing the overall level for teachers at a school site as well as within a district, region, or for the entire state. It is a learning community for educators to meet and participate in statewide projects. It is also a tool for districts to use with their staff to plan their professional development efforts.

### Teacher Leadership Project

This grant program was funded by the Gates Learning Foundation, and provided classroom teachers with an opportunity to learn how to integrate technology into the curriculum in their classrooms. The Teacher Leadership Project is a curriculum-based project designed for full-time K-12 teachers who have their own classrooms and who see the same group of students each day. The training modules are designed specifically for teachers in the following areas: language arts, social studies, science, and math.[2] Northwest ESD 189 is working on making these modules available online for educators throughout the state.

## *NETWORKING AND CONNECTIVITY*

This section provides information on Washington's K-20 Network and Internet2 ("Abilene").

### The K-20 Network[3]

The 1996 Washington State Legislature recognized the critical role of technology in education and authorized the building of the $55 million K-20 Educational Telecommunications Network. The result is a high-speed telecommunications backbone that enables the use of the Internet and live two-way videoconferencing in all of Washington's public educational sectors, and also connects the schools and sectors with one another. Believed to be the first of its kind in the nation, the K-20 Network was born from the collaborative efforts of representatives from K-12, community and technical colleges, baccalaureate institutions, the Department of Information Services, the Legislature, and private sector technology providers.

The K-20 Network now connects 475 public education sites throughout the state including campuses of community and technical colleges, regional universities, research institutions, public libraries, independent colleges, and the K-12 school districts and educational service districts. Over 1 million students and educators can now conduct or have the potential to conduct research and communicate with one another without the traditional constraints of distance and cost.

The network is particularly valuable in connecting rural communities: on a per student basis, 63 percent of the K-12 Intranet usage and 57 percent of the K-12 video usage is by rural students. The K-20 Network provides connectivity to one central point in each K-12 school district, with wide-area network (WAN) and local-area network (LAN) connectivity to school buildings being the district's responsibility.[4]

### Internet2

Because of the K-20 Network, Washington was one of the first five states selected to have direct access to the Internet2, the high-performance, next generation Internet (called "Abilene"). As a result, faculty and teachers in Washington's schools have opportunities to develop the next generation of Internet resources, applications, and tools - opportunities that were previously only available to faculty at major research institutions like the University of Washington. Also possible is easy access to multi-media content from learning centers, national museums and organizations such as the Smithsonian Institution and NASA.

## *STATEWIDE TECHNOLOGY SUPPORT FOR EDUCATION REFORM*

This section primarily addresses OSPI-supported initiatives in applying technology for educational assessment. OSPI uses technology to collect, store, analyze, and make available information valuable to districts, parents, and students on academic progress and performance.[5] Examples of ways that OSPI is using this type of technology are provided below.

### Report Card Web Site

The Report Card Web site[6] is an online application for researching and evaluating education data. Demographic information and test scores such as those for the Washington Assessment of Student Learning (WASL) and the Iowa Test of Basic Skills (ITBS) are available through this application. Test information for all 296 school districts and more than 2,000 school buildings is available through the Profile. The information available in the system can show how education is progressing at each testing level and help different audiences (e.g., the state, school districts, schools, parents, and community groups) look at this data from many different angles. In addition to raw scoring data, the Report Card Web site offers tools for searching and analyzing information based on criteria the individual user selects. Based on Microsoft SQL technology, the Report Card Web site is a powerful tool for data driven decision-making. It saves individual districts both time and money by providing this service at a state level instead of pushing it out to each of the 296 school districts and more than 2,000 school buildings in Washington State.

### Online Statewide Educational Standards

Washington has adopted statewide educational standards to establish common learning goals for all of its students.[7] This site also has information about Essential Academic Learning Requirements (EALRs) and Grade Level Expectations (GLEs), the state's academic standards, and the tests used to evaluate student progress against those standards, the Washington Assessment of Student Learning (WASL). Sample test questions are available at this site.

### School Improvement Planning (SIP) Web Tool

The School Improvement Planning (SIP) web tool[8] allows schools to continually collect and analyze information to determine the effectiveness of existing programs and services in schools, thereby providing a baseline from which schools can measure improvement. The data define areas of strength and potential growth areas for schools. Schools collect data in a variety of ways-written surveys and questionnaires, telephone and face-to-face interviews, group and "town" meetings, self-studies, checklists, observations, "shadowing" students, and reviewing standardized, criterion reference, school, and classroom based assessments. Using multiple indicators and diverse methods of collection gives a more accurate and detailed portrait of schools.

The collection of data from multiple sources serves three major purposes:

- To provide baseline information on students' skills and aptitudes.
- To guide action at the school, classroom, and student levels.
- To assess progress over time.

The School Improvement Planning tool has the following modules:

- Data Collection - Allows schools to collect data from state sources to construct, create, and build a school profile.
- School Profile - Provides the school or school district with the ability to create the profile by selecting, storing, sorting, and reviewing the data contained within the data collection module.
- Identify and Organize Goals - Provides grouping by theme for further definition of goal statements.
- Research - Provides the ability to define selected search paths for research to support the goals and themes identified in the School Improvement Planning Tool.
- Action Planning - Allows schools and school districts the ability to add strategies, activities, and action plans to the School Improvement Plan.
- Assessment and Evaluation - Allows for the use of rubrics and assessments by schools and school districts for the purpose of evaluating the accomplishments and progress of their plan.
- System-Wide Requirements - Gives the schools and school districts the ability to navigate via a web browser, to print reports and documents, to track progress of the overall School Improvement Plan, and to utilize data sources for analysis. At the end of the School Improvement planning tool, there is the ability to print a report.

## *ENDNOTES*

[1] The latest survey results are available online at http://www.k12.wa.us/EdTech/Survey.aspx

[2] The Teacher Leadership Project has been evaluated by Brown, Fouts, and Rojan (2001) and Dean, 2001.

[3] Adapted from Washington State Department of Information Services (DIS) description of the K-20 Network. Online at: http://www.dis.wa.gov/enterprise/k20network/index.aspx.

[4] Additional information on the K-20 Network, including exemplary uses of the network, is available at http://www.dis.wa.gov/enterprise/k20network/index.aspx

[5] The OSPI Web site address is: http://www.k12.wa.us

[6] The Report Card Web site address is: http://reportcard.ospi.k12.wa.us/

[7] The state academic standards are online at: http://www.k12.wa.us/CurriculumInstruct/EALR_GLE.aspx, and the Washington Assessment of Student Learning (WASL) is online at: http://www.k12.wa.us/assessment/WASL/overview.aspx

[8]The School Improvement Planning (SIP) Tool is online at: http://www.k12.wa.us/sip (password protected due to the sensitivity of the information; demonstration available upon request).

# *APPENDIX F*

# *Tiers of 8th Grade Technology Literacy Indicators*

One of the goals of Title II, Part D of the No Child Left Behind Act of 2001 (NCLB) is to "assist every student in crossing the digital divide by ensuring that every student is technologically literate by the time the student finishes the eighth grade, regardless of the student's race, ethnicity, gender, family income, geographic location, or disability." Defining technology literacy, though, was left up to each state. The 2005 Washington State Technology Literacy for Students Working Group defined technology literacy and fluency for Washington students, and also developed the "Tiers of 8th Grade Technology Literacy Indicators" for districts to use in assessing and reporting the level of technology literacy and fluency of 8th grade students, beginning with the 2005-06 school year.

This section reviews the definitions of technology literacy and fluency that were developed, and presents the "Tiers of 8th Grade Technology Literacy Indicators" with one set of examples for how these *might* be observed or assessed. However, each district is encouraged to visit the website at http://www.k12.wa.us/EdTech/TechLitTiers.aspx to download the Indicators *without* these examples, and populate it with examples that match their own district initiatives to share within their district. Optional resources to assist districts in assessing these tiers are under development and will be posted online at http://www.k12.wa.us/EdTech/TechRequirements.aspx.

## *DEFINITIONS OF TECHNOLOGY LITERACY AND FLUENCY*

**Technology literacy** is the ability to responsibly, creatively, and effectively use appropriate technology to:

- communicate;
- access, collect, manage, integrate, and evaluate information**;**
- solve problems and create solutions;
- build and share knowledge; and
- improve and enhance learning in all subject areas and experiences.

**Technology fluency** builds upon technology literacy and is demonstrated when students:

- apply technology to real-world experiences;
- adapt to changing technologies;
- modify current and create new technologies; and
- personalize technology to meet personal needs, interests, and learning styles.

# *TIERS OF 8th GRADE TECHNOLOGY LITERACY INDICATORS*

| **National Educational Technology Standards (NETS) for Students**<br><br>**8th Grade Performance Indicators. Students will:** | **Tier 1: Personal use and communication** | **Tier 2: Access, collect, manage, integrate, and evaluate information** | **Tier 3: Solve problems and create solutions** |
|---|---|---|---|
| | **Students in all tiers will use technology to build and share knowledge and to improve and enhance learning in all subject areas and experiences.** | | |
| | This tier focuses on students using technology to complete school work and for personal use. | This tier involves students using technology for research and/or public presentations. | This tier involves students using technology for authentic problem-solving and creating products. |
| **1. Apply strategies for identifying and solving routine hardware and software problems that occur during everyday use. (NETS 1)** | Students know how to connect and use a wide variety of input and output devices and common peripherals and how to access networked resources *(e.g., connect a mouse, keyboard, portable storage device, or digital camera to the computer, connect to a shared network drive).* | ** | Students demonstrate understanding of strategies for identifying, solving, and preventing routine hardware and software problems that occur during everyday technology use *(e.g., can problem-solve when a web page is non-responsive, force-quit a non-responsive program).* |
| **2. Demonstrate knowledge of current changes in information technologies and the effect those changes have on the workplace and society. (NETS 2)** | ** | ** | Students recognize, discuss, and analyze changes in information technologies and the effect those changes have on the workplace, society, and/or themselves *(e.g., understand the implications of Moore's Law, difference between data and knowledge).* |
| **3. Exhibit legal and ethical behaviors when using information and technology, and discuss consequences of misuse. (NETS 2)** | Students are acquainted with the legal and ethical issues related to use and misuse of information and communication technology *(e.g., follow the school/district's Acceptable Use Policy)*. | Students demonstrate understanding of issues related to acceptable and responsible use of information and communication technology such as privacy, security, copyright, file sharing, plagiarism, issues of personal safety *(e.g., correctly formatted citations for copyrighted materials).* | Students identify and develop scenarios or examples that illustrate ethical behaviors for use of copyrighted media and analyze the consequences of unethical use of information and communication technology *(e.g., hacking, spamming, consumer fraud, virus setting, intrusion).* |
| **4. Use content-specific tools, software, and simulations (e.g., environmental probes, graphing calculators, exploratory environments, Web tools) to support learning and research. (NETS 3 & 5)** | Students apply common software features to promote productivity *(e.g., use spellchecker, thesaurus, create basic spreadsheet charts, and insert media).* | Students select and use information and communication technology tools and resources to collect, evaluate and manage information and report results on an assigned hypothesis or research question *(e.g., gather and record data from scientific probes, using content-specific web resources).* | Students define problems or essential questions, then use and/or adapt content-specific technological tools to gather data, visualize information, or conduct investigations *(e.g., access primary source data to refute or support an original hypothesis, create and conduct surveys and analyze results).* |
| **5. Apply productivity/multimedia tools and peripherals to support personal productivity, group collaboration, and learning throughout the curriculum. (NETS 3 & 6)** | Students use specific tools to support personal productivity and enhance learning in different subjects *(e.g., keyboard effectively to a minimum level, use word processing and other productivity software to prepare assignments).* | ** | Students work individually or in teams to use hardware and software tools to support learning and creativity in all subject areas. *(e.g., use personal information management (PIM) software, personal digital assistants (PDAs), concept-mapping software, timeline development software, digital still and video cameras, probes, graphing calculators, digital microscopes).* |

***Performance Indicator does not apply to this tier.*

*TIERS OF 8th GRADE TECHNOLOGY LITERACY INDICATORS*

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| | **Students in all tiers will use technology to build and share knowledge and to improve and enhance learning in all subject areas and experiences.** | | |
| | This tier focuses on students using technology to complete school work and for personal use. | This tier involves students using technology for research and/or public presentations. | This tier involves students using technology for authentic problem-solving and creating products. |
| **6. Design, develop, publish, and present products (e.g., Web pages, videotapes) using technology resources that demonstrate and communicate curriculum concepts to audiences inside and outside the classroom. (NETS 4, 5, & 6)** | ** | Students create, publish and/or present products for an assigned project *(e.g., create effective PowerPoint or digital video presentations, post webpages of class work).* | Students initiate projects, design and develop content, and construct web-based and/or other electronic products *(e.g., construct and publish a WebQuest, create a Flash movie).* |
| **7. Collaborate with peers, experts, and others using telecommunications and collaborative tools to investigate curriculum-related problems, issues, and information, and to develop solutions or products for audiences inside and outside the classroom. (NETS 4 & 5)** | ** | Students use telecommunications tools to access or exchange information for an assigned project *(e.g., e-mail a subject-matter expert).* | Students work collaboratively using technology to develop and share ideas or information *(e.g., use web-based collaborative tools such as wikis, discussion boards, weblogs; use interactive whiteboard for classroom brainstorming).* |
| **8. Select and use appropriate tools and technology resources to accomplish a variety of tasks and solve problems. (NETS 5 & 6)** | Students select from a limited set of technology tools to complete assigned work *(e.g., use a spreadsheet to represent data).* | Students select from a variety of teacher-defined technology tools to solve specific problems or present results *(e.g., choose between PowerPoint and iMovie to present information to the class).* | Students identify, evaluate, and select appropriate technology tools to solve problems or create products *(e.g., based upon a desired end-product, some students select MovieMaker to create a video presentation while others select Publisher to create a brochure).* |
| **9. Demonstrate an understanding of concepts underlying hardware, software, and connectivity, and of practical applications to learning and problem solving. (NETS 1 & 6)** | Students understand basics of file storage, file formats, and networking *(e.g., understand the use of "save as" to change file format; back up files regularly).* | ** | Students explore various ways that information and technology resources can be combined, personalized, or re-purposed to develop and promote understanding *(e.g., edit content and change format of audio file to create a podcast).* |
| **10. Research and evaluate the accuracy, relevance, appropriateness, comprehensiveness, and bias of electronic information sources concerning real-world problems. (NETS 2, 5, & 6)** | Students apply search strategies to find relevant online information *(e.g., conduct a Boolean search to find information for an assignment).* | Students search, collect, and evaluate the accuracy and relevance of information from electronic resources *(e.g., check the credentials of the online source or look for supporting evidence).* | Students evaluate information from a variety of electronic resources for appropriateness, comprehensiveness, and bias *(e.g., understand the potential bias of a sponsored link).* |

***Performance Indicator does not apply to this tier.*

# *APPENDIX G*

# *Tiers of Technology Integration into the Curriculum Indicators*

One of the goals of Title II, Part D of the No Child Left Behind Act of 2001 (NCLB) is to "encourage the effective integration of technology resources and systems with teacher training and curriculum development to establish research-based instructional methods that can be widely implemented as best practices by State educational agencies and local educational agencies." Defining technology integration, though, was left up to each state. The 2005 Washington State Technology Integration into the Curriculum Working Group defined technology integration, and also developed the "Tiers of Technology Integration into the Classroom Indicators" for Washington districts to use in assessing and reporting the level of technology integration of its teachers, beginning with the 2005-06 school year.

This section reviews the definition of technology integration that was developed, and presents the "Tiers of Technology Integration into the Classroom Indicators" with one set of examples for how these *might* be observed or assessed. However, each district is encouraged to visit the website at http://www.k12.wa.us/EdTech/TechIntTiers.aspx to download the Indicators *without* these examples, and populate it with examples that match their own district initiatives to share within their district. Optional resources to assist districts in assessing these tiers are under development and will be posted online at http://www.k12.wa.us/EdTech/TechRequirements.aspx.

## *DEFINITION OF TECHNOLOGY INTEGRATION*

- Educators use technology to create rich environments where student work shows evidence of conceptual understanding beyond recall.
- Educators use technology to encourage students to engage in activities that develop understanding and create personal meaning through reflection.
- Educators use technology to provide opportunities for students to apply knowledge in real world contexts.
- Educators and students incorporate suitable technology to engage in active participation, exploration, and research.
- Educators use technology to provide diverse and culturally relevant experiences to help students develop an understanding of our world.
- Educators use technology to enhance and differentiate instruction in order to present students with a challenging curriculum designed to help each individual student develop a depth of understanding and critical thinking skills.

- Educators use technology for meaningful assessment data that informs their practice and allows students to exhibit higher order thinking and to demonstrate knowledge.
- Educators use and facilitate student use of technology to communicate, collaborate, and create communities with educators, parents, students, and additional stakeholders.

The phrase “use technology” should be seen as a continuum of constantly increasing skills that employs the appropriate cognitive demand as defined in Bloom’s Taxonomy and includes concepts such as: incorporate, exploit, leverage, employ, etc.

All of the above components are in support of Washington State’s learning goals and the state Essential Academic Learning Requirements and Grade Level Expectations.

# Tiers of Technology Integration into the Classroom Indicators

| | Tier 1: Teacher Focus on Productivity | Tier 2: Instructional Presentation and Student Productivity | Tier 3: Powerful Student-Centered 21st Century Learning Environment |
|---|---|---|---|
| | This tier focuses on the teacher using technology to get their job done. | This tier involves teacher facilitation of large group learning activities and student productivity use of technology. | This tier promotes students to be actively engaged in using technology in individual and collaborative learning activities. |
| **Observable Indicators** | Teachers:<br>• Locate standards using electronic tools to align lessons *(e.g., use the online Grade-Level Resources site and locate EALRs/GLEs on OSPI website)*<br>• Find instructional resources on the Internet *(e.g., find lesson resources at Marco Polo, district, or state websites)*<br>• Produce, store, and retrieve learning materials electronically (*e.g., create lesson plans in Word and store them on file server, create and print handouts for students that can be saved and modified in future years)*<br>• Keep/organize student information, grades more effectively *(e.g., use electronic gradebook, extract achievement data from student information system, graph student progress using Excel)*<br>• Communicate information to parents and students via web or e-mail *(e.g., post upcoming events or assignments on school webpage)*<br>• Communicate quickly with e-mail *(e.g., respond to e-mail from parents, learn about school meetings and events via internal e-mail)* | Teachers:<br>• Conduct one-computer classroom lessons *(e.g., use software such as Decisions, Decisions and Timeliner by Tom Snyder, lead virtual field trips to museums using K-20 Network)*<br>• Deliver presentations with graphics and sound *(e.g., teachers use software such as PowerPoint, Keynote, or audio production software)*<br>• Lead students in brainstorming and sharing ideas *(e.g., teachers use word processing programs or software such as Inspiration, use Intel Visual Ranking website)*<br>• Represent information visually *(e.g., teachers create graphs in Excel or with a graphing calculator to visually represent chemical interactions)*<br>• Facilitate group discussions and lessons *(e.g., teachers use interactive whiteboards, LCD projectors, student response systems)*<br>• Have students write papers and reports on assigned topics using computers or "smart keyboards" such as AlphaSmarts *(e.g., require that all student papers must be word-processed)*<br>• Create scaffolding for student projects *(e.g., teachers provide students with writing prompts or project templates)*<br>• Facilitate students using technology for assessment *(e.g., teachers use online quizzes or diagnostic tools, graph and analyze progress with class using Excel)*<br>• Interactively communicate with parents and students *(e.g., teachers initiate and respond to e-mail, conduct on-line surveys, interact through website)* | Teachers enable students to:<br>• Create and use online resources to facilitate inquiry *(e.g., students create and use online resources such as WebQuests)*<br>• Engage in inquiry-based projects driven by essential questions (e.g., *students create major research projects such as Big 6 essential question projects)*<br>• Direct their own use of technology *(e.g., students stay current with new information through tools such as RSS feeds)*<br>• Research, analyze data and problem-solve in a global context *(e.g., student engage in projects such as ThinkQuest with classrooms in other states or countries)*<br>• Engage in individual or collaborative project-based learning *(e.g., students engage in real-world projects and problem-solving using email or websites)*<br>• Use modeling and simulations *(e.g., students conduct simulations using online resources)*<br>• Write, develop and publish individual and collaborative products *(e.g., students publish projects online to be reviewed by parents or peers)*<br>• Invent products through programming or production *(e.g., students produce how-to videos or movies to share with others)*<br>• Create scaffolding for their own projects *(e.g., students create writing prompts or project templates)*<br>• Are involved with their parents and teachers in the analysis of student data and meeting standards, or participate in developing their own learning plans *(e.g., students use classroom-based assessments and assess their own work)*<br>• Initiate communication with parents, teachers, community members, or other students *(e.g., students display self-directed communication through tools such as weblogs)* |