



California ICT Digital Literacy Policy Framework

Prepared
for
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California ICT Digital Literacy Policy Framework

Introduction

Policy leaders in California, in order to improve the quality of life and prepare a competitive workforce for the 21st Century, must consider how to create and support an ICT (Information and Communication Technologies) digital literacy policy that will:

- Promote a commitment to ICT digital literacy as a basic skill required for all residents.
- Encourage institutional support of ICT digital literacy strategies in education, workforce preparation and government services.
- Enhance ICT digital literacy opportunities in technological innovation and workforce readiness.
- Support benchmarking and adoption of metrics that reflect globally-accepted standards.
- Develop timetables and milestones to ensure appropriate accountability for assessing timely progress and ultimate success.

A policy that considers the above factors will assist in capturing the full opportunity for California and all of its citizens to fully and competitively participate in a 21st Century global economy with equal access to and use of advanced technologies. Fundamental to the success of such a policy strategy is acknowledgment that ICT digital literacy is the new 21st Century basic literacy, and that every citizen must be competent in these new basic skills.

In consideration of the need for such a policy, this document presents the following:

1. A Proposed Resolution and Proclamation of the Governor of California
2. A Proposed California ICT Digital Literacy Policy and Strategy

These documents are based on research of global ICT policy initiatives and digital literacy strategies. They offer an approach for California based on best practices, and are presented to the Governor, State Superintendent of Education, and Legislature to consider in enacting a state policy.

Section I:

PROPOSED RESOLUTION

Proclamation of the Governor of California

WHEREAS, Information and Communications Technology (ICT) Digital Literacy is defined as using digital technology, communications tools and/or networks to access, manage, integrate, evaluate, create and communicate information in order to function in a knowledge society;

WHEREAS, a California ICT Digital Literacy Policy will ensure that our State will maintain global leadership in information and communications technological innovation and workforce competitiveness;

WHEREAS, our students and employees must be ready for the workforce of the 21st century, where digital literacy skills are critical to a California's ability to compete successfully in a global information and knowledge economy;

WHEREAS, the workforce of the 21st Century is increasingly required to be digitally literate;

WHEREAS, a collective mindset favoring digital literacy and the understanding that information and communication technologies improve the quality of life in the 21st century;

WHEREAS, the State of California should bring digital literacy strategies to government, education, health care, business and other areas in order to enhance opportunities for our people, firms, institutions and government entities to be world leaders in technological innovation;

WHEREAS, a digital literacy policy and framework would support a continuum of digital literacy skills, benchmarking and metrics that are consistent with globally accepted standards, and would ensure accountability for assessing progress and success; therefore, be it

RESOLVED, That the Governor and Legislature of the State of California support steps to enable the people of California to participate competitively in the 21st century global workforce, and harvest the benefits of an information and knowledge society;

RESOLVED: That California will promote: (1) access to information and communications technology by our people regardless of income or advantage; (2) the provision of ubiquitous broadband service in a competitive marketplace at affordable cost; (3) opportunities for our people to acquire ICT digital literacy skills in order to benefit academically, economically and socially; and (4) a California ICT Digital Literacy Policy that declares that all residents of California will be digitally literate.

PROPOSED

Provisions of the California ICT Digital Literacy Policy and Strategy

To fulfill the Governor’s ICT Digital Literacy Policy intent, the State of California enacts a digital literacy policy for the State that hereby declares that all residents of California will be digitally literate.

The definition of digital literacy shall be:

ICT Literacy is using digital technology, communications tools and/or networks to access, manage, integrate, evaluate, create and communicate information in order to function in a knowledge society.

The basic elements of ICT digital literacy, as globally accepted and as defined above, are:

BASIC ELEMENTS OF DIGITAL LITERACY		
Elements	Definitions	Competencies
Access	Knowing about and knowing how to collect and/or retrieve information.	Search, find, and retrieve information in digital environments.
Manage	Applying an existing organizational or classification scheme.	Conduct a rudimentary and preliminary organization of accessed information for retrieval and future application.
Integrate	Interpreting and representing information - summarizing, comparing, and contrasting.	Interpret and represent information by using ICT tools to synthesize, summarize, compare, and contrast information from multiple sources.
Evaluate	Making judgments about the quality, relevance, usefulness, or efficiency of information.	Judge the currency, appropriateness, and adequacy of information and information sources for a specific purpose (including determining authority, bias, and timelines of materials).
Create	Generating information by adapting, applying, designing, inventing, or authoring information.	Adapt, apply, design, or invent information in ICT environments (to describe an event, express an opinion, or support a basic argument, viewpoint or position).
Communicate	Communicating information persuasively to meet needs of various audiences through use of an appropriate medium.	Communicate, adapt, and present information properly in its context (audience, media) in ICT environments and for a peer audience.
Note: Existing international and national digital literacy frameworks and assessment instruments all share these common elements.		

A seamless continuum with benchmarks, metrics, assessments and certifications endorsed by the State to identify the ICT digital literacy competencies of residents, students, and workers shall comply with the definition, elements, and competencies as stated above.

In order to achieve digital literacy of all residents the Legislature specifically requires that:

A. The **California Labor and Workforce Development Agency**, in collaboration with the California Emerging Technology Fund (CETF), should be assigned the responsibility to:

1. Develop a “roadmap for success” in achieving workforce digital literacy competencies. It must be developed as a public-private partnership initiative and must address the following:
 - Identification of metrics for statewide benchmarking and diagnosis, and measuring work force capabilities, needs, and progress toward State endorsed competencies in digital literacy.
 - Adoption of a seamless continuum of ICT digital literacy skills aligned to appropriate assessment, curricula and diagnostic tools.
 - Certification to global standards and based on the State definition and elements as stated.
 - Consideration of special assessment tools to address cultural and linguistic relevance of diverse populations and ubiquitous access to all geographic areas.
 - Promotion of local work force initiatives that encourage ICT digital literacy skills acquisition.
2. Allocate resources for implementation of a statewide public awareness campaign highlighting benefits of digital literacy as a 21st Century skill necessary for the State’s economic well being, work force skills development and an informed citizenry.
3. Convene a public-private sector coalition focused on implementing recommendations of the California Broadband Task Force (CBTF) and CETF efforts related to digital literacy and public awareness.
4. Collaborate with private sector assessment partners to identify criteria, processes and required tracking mechanisms to benchmark digital literacy levels of the California workforce.
5. Initiate pilot projects throughout the state for highlighting projects of digital literacy skills assessment and acquisition.
6. Include special assessment tools to address cultural and linguistic relevance of diverse populations and ubiquitous access to all geographic areas, and ensure students, workers, and other residents of the State with disabilities are able to access the tools they need to become digitally literate.
7. Support research and development to make sure adaptive devices comply with provisions of the American Disabilities Act.

B. The **California Workforce Investment Board (CWIB)** must develop an explicit technology literacy component, including its financing, for its five-year Strategic State Plan.

This technology literacy component will accomplish the following:

1. Raise the level of digital literacy in California by supporting technology training and integrating digital literacy skills into workforce development activities.
2. Focus State and local Workforce Investment Act (Title I) funds toward teaching ICT digital literacy skills by supporting a 10 percent increase over the next two years.
3. Expand Career Technical Education (CTE) opportunities in community colleges.

4. Build consensus at the State and local community levels by identifying digital literacy ecosystems to drive models of excellence, benchmarking, and reliable metrics for measuring success.
5. Initiate benchmarking and appropriate tracking of large populations and providing appropriate diagnostics for citizens to self empower in order to acquire digital literacy 21st Century skills.
6. Provide workforce examples of skills training and job-placement community-value projects for e-government, e-health services or other conveniences.
7. Engage the ICT industry and entertainment mega-industry along with large employers statewide in both the media and applications requirements.
8. Highlight collaborative models in underserved communities and in culturally diverse populations.
9. Build and resource a strong coalition empowered with achieving near-term action and results-oriented outcomes.
10. Reward success to reinforce best practices, individual champions, economic results, and public awareness and support.
11. Recommend to the Legislature ways of providing tax incentives to technology-based businesses offering technology training and technical support to at-risk communities, particularly disabled and low-literacy populations.

C. **K-20 Educators** must develop a “California performance skills framework for education” based on the globally endorsed elements of digital literacy. This framework is necessary to ensure that the State’s students have the 21st Century skills for success in the work force and a global society. The framework must consider:

1. Adoption of the International Society for Technology in Education (ISTE) National Education Technology Standards (NETS) for students, teachers, teacher librarians, and school leaders.
2. ICT digital literacy skills requirements for pre-service and in-service training for teachers and teacher librarians.
3. Offering of courses for in-service teachers focused on integrating technology across curricula.
4. Integration of ICT digital literacy skills requirements into credentials for pre-service teachers.
5. Adoption of new approaches to professional development emphasizing skills based and performance based learning.
6. Provision of incentives for teachers to achieve digital literacy credentials, and incorporate digital literacy into their teaching practices.
7. Incorporation of knowledge of digital literacy competency in the high school exit portfolio with specific recognition that digital literacy is an essential 21st Century complement to the required foundational skills literacy of reading, writing and math.
8. Alignment of content standards with global ICT digital literacy standards and assessments.
9. Development of a technology-enabled curriculum with project-based and skills-based learning outcomes.
10. Integration of ICT digital literacy skills into core requirements and AP instruction – starting with science, technology, engineering and mathematics (STEM) curricula.
11. Mastery of ICT digital literacy for PSAT and ACT, and identification of required diagnostics.
12. Recognition of the California Community Colleges as the hubs of communities for vocational preparation and digital literacy skills development.

13. Establishment of program for a Masters Degree in Internet Teacher Education with 75% of the requirements for the degree completed online.
14. Articulation and accountability at post-secondary level of need for global workforce transferability by ensuring all certification and assessments meet global standards.
15. Calibration and benchmarking of statewide digital literacy levels to economic indicators important for student readiness, workforce preparedness, and California competitiveness.

Furthermore, the home, libraries and community centers should be encouraged as hubs of online learning activities with equitable access to digital learning skills and content. Therefore, school administrators must support ways to offer creative ways to finance packages for educators to purchase equipment for home access to online educational applications.

Section II:

Rationale, Research and Best Practices

In November 2006, Governor Schwarzenegger established the California Broadband Task Force (CTBF) as part of Executive Order S-23-06. In initiating this activity, the Governor provided leadership in moving California forward to join forces with numerous countries around the world in acknowledging that information and communication technologies (ICT), specifically enhanced by deployment of broadband infrastructure, are critical to economic development and global competitiveness.

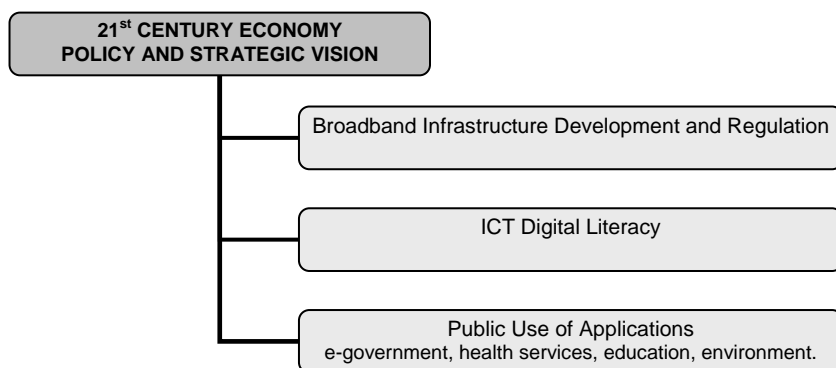
Following extensive research, analysis and stakeholder input, the Task Force released its findings in January 2008 on California's status in broadband deployment, accompanied by recommendations to ensure the State's role as a world leader.

Concurrent with the release of the CTBF Report, the California Emerging Technology Fund (CETF), a non-profit organization dedicated to closing the Digital Divide and making California a global leader in the deployment and adoption of broadband technology, released a consensus report from the ICT Digital Literacy Leadership Roundtable held in November 2007. The report sets forth a "call to action" for policymakers, employers, educators, and other stakeholders to endorse an ICT Digital Literacy Policy for California to ensure that students and workers are prepared for a 21st Century economy. It is imperative that California take immediate steps toward addressing the need for a digitally literate citizenry.

Both the CTBF and the CETF efforts agree on the need for addressing requirements for a 21st Century skilled workforce if California is to remain globally competitive and maintain a leadership role in innovation of information and communication technologies. Furthermore, its residents will be able to enjoy the benefits of a technologically enriched society. Both reports acknowledge the importance for State policymakers to develop a shared vision and to provide leadership to reach a goal of a digitally literate society able to function successfully in the 21st Century.

These reports, along with numerous existing initiatives and policy statements, reinforce that best practices have common components of a successful ICT policy initiative. Most policies at a minimal acknowledge that an ICT policy framework must address broadband infrastructure development, effective regulatory policies, digital literacy in education and human capacity building, and effective applications for public use of services such as e-government, e-health, and improving the environment, among others. The following chart illustrates this relationship.

Components of ICT Best Practices



Global bodies, such as the World Summit on the Information Society (WSIS), UNESCO, and other sovereign nations recognize these components as necessary to the achievement of broader 21st Century policy goals and strategic objectives in sectors such as health, education, e-commerce, and e-government. Information literacy or digital literacy is, per se, integral to achievement of all these broader objectives. Furthermore, existing ICT policy initiatives recognize the need and potential of ICT literacy as a catalyst for socio-economic development and global competitiveness.

The matrix below, extrapolating from numerous international policy documents and strategic initiatives, further delineates key policies and strategies common in each of the above components. They are necessary to achievement of the broader ICT vision:

Infrastructure	Regulation	Digital Literacy	Public Services
<p>Government leadership fosters the development and deployment of broadband infrastructures by:</p> <ul style="list-style-type: none"> • Formulating a Vision and Policies. • Promoting competition in the supply of ICT infrastructure and services. • Supporting ICT broadband initiatives. • Supporting policies that advance standardized certification and assessment. 	<p>The regulatory framework is supportive of ICT by:</p> <ul style="list-style-type: none"> • Promoting competition in ICT infrastructure and services. • Stimulating universal access to ICT services. • Developing a single regulatory framework for convergent multi-media technologies. 	<p>Education and workforce development policies encourage ICT digital literacy by:</p> <ul style="list-style-type: none"> • Adopting 21st Century learning skills. • Supporting teacher training in ICT skills. • Seeding programs to increase digital literacy and workforce skills. • Benchmarking progress with standardized assessments and certification to global standards. 	<p>The government embraces ICT by:</p> <ul style="list-style-type: none"> • Optimizing ICT deployment in government operations. • Using ICT to deliver a wide range of government services. • Advancing applications for citizens through public-private partnerships.

In further analysis of exemplary ICT digital literacy policies and strategies from other states and countries, additional factors emerge that are relevant to implementation of a successful digital literacy policy. They are:

1. Establishing a visionary public policy environment that asserts a Digital Divide is unacceptable and embraces a goal of digital literacy for all residents.
2. Adopting global standards and benchmarking for ICT digital literacy skills and certification.
3. Initiating sustainable ICT projects to expand digital literacy skills and build workforce capacity.
4. Providing universal and affordable access to information technology for all residents, with a particular commitment to ensuring equal opportunities to economically disadvantaged communities and vulnerable populations.

It is illustrative how other countries and regions have approached ICT strategies and policies, and specifically how they have addressed the digital literacy needs within those initiatives. For example, the European Union, considered a leader in digital literacy, describes its intent relating to workforce needs and digital literacy in the following way:

The main policy objective is to contribute to improve framework conditions in Europe for the provision of a world-class e-skilled workforce to achieve stronger productivity, economic and social benefits and for the reduction of the digital divide.

The EU recognized a need to:

1. *Develop optimal policies to prepare new workers and support current ones as they face the challenges of ICT led change and globalization;*
2. *Reduce the digital divide and ensure that its citizens are digitally literate; and*
3. *Provide a coordinated and timely response to implement change successfully.*

The private sector has also advanced this mindset by leading collaborative efforts in digital literacy. For example, the Asian Development Bank (ADB), in its Long Term Strategic Framework, has embarked on corporate partnerships to advance regional digital leadership. According to the ADB a skilled 21st Century workforce is a priority for governments across the region, and is seen as an important factor in encouraging foreign investment. Simply stated, the framework acknowledges:

Those countries which have a clear policy objective to develop local ICT expertise and know-how and which align programs such as education, skills and digital literacy in support are most likely to achieve that objective with resulting benefits to their communities, businesses and public administration. (Source: Asian Development Bank- Long Term Strategic Framework)

At a nation level, Singapore, in an effort to support development of ICT skills, started with a levy on the use of low-paid labor that “encouraged” its citizens and companies to improve ICT skills. The levy was part of an initiative on Integrated Workforce Development. A program called CREST (Critical Enabling Skills Training) called for the training of workers in companies by a network of private providers on “critical skills” to acquire knowledge: learning to learn, literacy, listening and oral communication skills, problem solving and personal effectiveness, organizational effectiveness and leadership. The government, through a Productivity Standards Board, set the standards and desired outcomes. While not realistic for the United States, the approach, however, demonstrates the priority and creativity given to ICT skills acquisition in developing countries.

Among many countries, whether considered developed or developing, there is substantial acknowledgement of the importance of digital literacy as it relates to economic development, productivity, cultural advancement, or social cohesion. Singapore, Korea, Jordan, Finland all have policies and efforts underway to increase the training and upgrading of digital literacy skills. Jordan, for example, created a program of economic and social transformation in 2001 to develop high value-added sectors and to establish a knowledge economy. The top priority in this program has been the development of the nation’s human resources skilled in digital literacy, among other considerations.

As previously discussed, there are numerous successful ICT digital literacy policies and strategies already being implemented around the globe. California does not need to reinvent the wheel in developing its own policy or strategy. However, because there are only a few states across the United States with policy initiatives in place to address the issue of ICT digital literacy, this research suggests strongly that best examples for California, in light of its global competitiveness and economic development needs for the future, are primarily models in other countries.

Almost every country studied, including those that are considered to be “advanced,” e.g. the European Union, Japan, Korea, Finland, is concerned about the lack of ICT skilled human resources, the need for widespread teacher training in ICT, and increased efforts to increase the ICT digital literacy of the young as well as those in the workforce. (See Appendix for a key global policies and initiatives.)

Within the United States, Kentucky is probably the most referenced state in advancing ICT strategies for economic development and education. Kentucky's 2004 *Prescription for Innovation* is a comprehensive plan to accelerate technology growth, particularly in the areas of broadband deployment and technology literacy and usage. The initiative maintains four key goals for affecting statewide economic development:

- Full broadband deployment by the end of 2007.
- Improved use of computers and the Internet.
- A meaningful online presence for all Kentucky communities, to improve citizen services and promote economic development through e-government, virtual education, online healthcare.
- E-Community Leadership Teams in every county focused on growth strategies for local government, business and industry, education, healthcare, agriculture, libraries, tourism, and community-based organizations.

These goals are consistent with the common attributes for success previously discussed in global best practice models.

In their broader efforts to improve social welfare and bring about economic opportunity for the people, many regions of the world have advanced some form of ICT policy, some comprehensive and others less so. For example, in the East African nations many have initiated broad-based ICT policies and master plans; some influenced by development agencies, and others like Mauritius inspired by Asian countries such as Singapore and India. Mauritius has an advanced ICT policy, being less dependent on external assistance both in policy development and in implementation of ICT programs. Rwanda, on the other hand, has a detailed ICT strategy developed through external assistance. However, the plan is inconsistent with the country's political reality, the level infrastructure deployment, and the resources and the capacity of institutions to implement them.

Despite the growing enthusiasm for e-strategies, the fundamental building blocks such as the commitment of policy makers and the infrastructure and human resources are lacking in many countries. Lack of technical and policy capacity means that countries typically rely on external experts to identify ICT programs on their behalf. Experience shows that developing ICT policies by building upon a shared vision, relying on local expertise and focusing on building blocks such as telecommunication policies and human resource development leads to better results than ambitious lists of projects lacking in alignment to an overarching mission.

In summary, the ultimate success of ICT and digital literacy policy efforts appears to be directly linked to a vision, leadership commitment, broadband infrastructure deployment and a favorable policy climate.

Role of Multiple Stakeholders

In addition, an analysis of best practices indicates that the implementation of the most successful strategies must also include the “buy-in” and participation of multiple stakeholders with distinct roles.

Based on this important aspect, the following matrix of stakeholder roles, based on review of global best practices, is proposed for consideration in formulating and successfully implementing a successful policy and digital literacy strategy for California.

California ICT Digital Literacy Policy and Strategy – Matrix of Global Best Practices – Stakeholder Roles

	State Level	Local Entities	K-12, Colleges and Universities	Business and Other Key Stakeholders	Individuals
21st Century Economy	Adopt Policies in support of an ICT Digital Literacy Roadmap for Success that meet globally recognized standards.	Adopt ICT digital literacy skills framework for education and workforce.	Develop a California Performance Skills Framework for K-20 Education.	Lead strategic alliances to support economic policies based on an ICT digital literacy foundation.	Demonstrate a willingness to seek training for employment in ICT related jobs.
	Provide an ICT literacy vision and needed leadership.	Initiate local projects based on existing best ICT practices.	Work with government, K-12 and industry to develop ICT skills competencies needed for the work force and high school exit.	Provide up to date meaningful statistics and benchmarks to track and reduce the skills gap.	Be flexible in employment opportunities.
	Conduct ICT literacy census.				
	Require standardized skills, certifications and assessments.	Build public-private sector partnerships.	Infuse digital literacy into teacher education curriculum and professional development.	Seed models of innovation.	Use technology in the home.
21st Century Learning and Workforce	Adopt an ICT Digital Literacy definition and elements based on global standards.	Add ICT literacy to school board education exit requirements based on ISTE-NETS standards.	Align assessments and certifications to global standards with supporting diagnostics and curriculum.	Increase decentralized workforce training by initiating pilot projects in digital literacy with local entities.	Be willing to engage in digital literacy skills acquisition and lifelong learning.
	Encourage a citizenry mindset of lifelong learning.	Develop teacher qualifications for mastery of ICT digital literacy.	Require digital literacy competencies for teacher credentials.	Promote the job training in ICT digital literacy skills.	Show ambition to learn new methods and ICT related skills.
	Enhance understanding of statewide qualification structures to facilitate workforce opportunity and mobility.	Increase ICT training and certification opportunities for workforce development.	Incorporate digital literacy competencies into vocational training.	Seed pilot projects.	Recognize the need for continuous improvement and self-assessment in digital literacy capabilities.
			Adopt ICT digital literacy requirements for high school exit requirements.		
21st Century Citizenry	Promote a digitally literate 21st century citizenry.	Recognize ICT skills for professional and vocational training.	Promote lifelong learning and e learning.	Foster dialogue with diverse stakeholders.	Foster the use of ICT in social environments and family groups.
	Advance e-government and ICT applications for health, environment and e learning.	Provide incentives for retraining employees.	Require ADA compliance for assistive devices, software design and curriculum.	Collaborate with Government on a Public Awareness Effort.	Participate in e learning at home, libraries, community centers.
	Provide equal opportunities by supporting policies that eliminate the digital divide.	Encourage under-represented groups to acquire digital literacy skills (women, long-term unemployed, the disabled).		Work with local entities to train the long term unemployed and other target groups in key e-skills for business.	Apply digital literacy skills to access health, e-government, banking, and to support healthy environment.
	Support universal access to broadband technologies.			Establish statewide pool of ICT digitally literate workers.	

CONSENSUS DOCUMENT

Roles of Key Stakeholders

It will take a collaborative effort to reach the goal of an ICT digitally literate population and workforce in California. Specifically, the K-20 education segments and the business community must work in tandem to achieve success. Many projects and initiatives are already underway throughout the State. The challenge will be to bring them together with a shared vision, common definition of ICT digital literacy, and with “buy-in” on developing a seamless continuum for digital literacy aligned to assessments, standards, and certification.

A. Role of K-20 Education Stakeholders

The role of ICT digital literacy in formal education has long been acknowledged. A decade ago the International Society for Technology in Education (ISTE) released recommendations that supported incorporating K-12 digital literacy – or educational technology - skills into the academic standards. ISTE’s recommendations, known as National Educational Technology Standards (NETS) have been endorsed by a majority of states as fundamental to K-12 standards and high school graduation requirements. These standards, used by school districts in every state and in many countries, are credited by most with significantly influencing expectations for students and creating a target of excellence relating to technology use and skills development.

In 2007, ISTE released the next generation of NETS for Students, focusing more on skills and expertise and less on tools. The updated NETS standards further acknowledge the importance of the digital literacy role K-12 curricula. Specifically, they address:

- Creativity and innovation.
- Communication and collaboration.
- Research and information fluency.
- Critical thinking, problem solving, and decision-making.
- Digital citizenship; and technology operations and concepts.

Many districts in California are already incorporating these new ISTE NETS standards into their technology plans. At the State level, California educational policy makers have yet to endorse the NETS. The Governor’s Broadband Task Force and the CETF Leadership Roundtable both reference the relevance of the ISTE standards as integral to the California ICT Digital Literacy Policy.

As California advances into the 21st Century, current and future teachers, and teacher librarians must be prepared to meet the needs of technologically literate students. Teachers must be certified in digital literacy so that they can assist the process and enable the students of today and tomorrow to acquire the prerequisite skills needed to compete in their chosen academic, career, cultural, and social pursuits. Through the embedding of digital literacy training and certification programs in pre-service and professional development teacher education curricula, the advancement of digital literacy will be accomplished within the State.

B. Role of Community Colleges Redefined

The California Community Colleges (CCC) has a key role to play in ensuring a digitally literate citizenry. The CCC is a vital link between K-12 education, academic and professional degrees and the workforce. Therefore, the CCC represents a significant stakeholder constituency in the State's efforts to ensure the achievement of 21st Century skills for all residents of the State. The CCC must play a leadership role in collaborating with business and educators on the development of a seamless continuum of skills, and in offering opportunities for student assessment, acquisition, and certification of ICT digital literacy.

C. Role for Business Leaders

The business community has been most vocal in expressing the need for an ICT digitally literate workforce. Business leaders have long recognized that in a competitive global economy a growing proportion of jobs now require at least a basic level of digital literacy, with many of the best jobs demanding even stronger digital skills. A paper issued by the National Policy Association's Digital Economic Opportunity Committee (DEOC) in 2006 acknowledged an American workforce crisis of workers lacking adequate 21st Century skills needed to fuel the information age economy. Importing foreign workers to address the IT worker shortage was viewed as only a stopgap measure.

The paper specifically focused on the following scenarios should the nation not effectively address skills building in information technologies:

- *Businesses will be less able to hire sufficient numbers of skilled workers at the wage levels needed to be productive and competitive. Although companies can compensate for this IT skills gap in a growing economy through higher productivity, such a solution cannot be sustained in the long run.*
- *Schools at all levels will be less able to hire enough instructors with the skills that are needed to train the workers of today and those of tomorrow.*
- *Government will be less able to hire enough skilled workers to carry out the increasingly ICTdependent functions of providing for the health, welfare, and protection of the country.*
- *Workers will have fewer opportunities to obtain good jobs, better pay and benefits, and a better quality of life.*

Many countries have already developed national "frameworks" and "roadmaps" for education and training, and strong national policies to support workforce training for the jobs of the future. These efforts have been developed with public-private sector stakeholder collaboration.

CONSENSUS DOCUMENT

The U.S. Chamber of Commerce's Institute for a Competitive Workforce launched in July 2007, a new *Digital Skills Working Group* that will seek to equip American workers with the skills they need to operate computers and the rapidly evolving software applications and programs businesses commonly use. The Working Group focuses the importance of "digital skills" in the U.S. economy; work toward a clearer consensus across industry sectors on the definitions of the necessary skill sets; and identify the major opportunities available to U.S. workers to receive effective training in the use of digital skills on the job. California's business sector can follow this type of model.

ACT, a well known U.S. assessment company, is promoting a *National Career Readiness Certificate* as a standard of work readiness to address the ICT skills crisis and is working in collaboration with educational institutions around the country. The certificate is earned when students demonstrate workforce skills preparedness based on international standards and competencies. Collaborative initiatives between business, government, community colleges, and other stakeholders in Iowa, Kentucky, and Michigan, just to name a few, are also exploring benchmarking, standardized certificates of skills readiness. Other global assessment providers such as Educational Testing Service (ETS), Certiport, and ICDL-US are engaged with the California State University and other California institutions and stakeholders to address benchmarking, assessment and curriculum development for implementing a statewide digital literacy effort. However, these initiatives are for the most part driven by vendors and are lacking in alignment to a standardized seamless continuum of skills.

Unlike many other countries, in the United States there are no national or statewide assessments in place for digital literacy certification for a 21st Century workforce. The European Union, for example, has standardized certification requirements in ICT skills that are supported by the business sector and a fundamental component of applications for employment. This collaborative approach is being replicated in countries in Asia such as Singapore and North Korea, the Middle East such as Jordan, Australia, New Zealand, among many others.

Summary

California policy makers have the opportunity to take a leadership role in implementing policies and strategies that align multiple efforts already underway. This can be accomplished by enacting an ICT digital literacy policy built upon a basic definition of ICT digital literacy and requiring that a seamless continuum be developed that is in alignment with assessments, curriculum, certification, benchmarks and metrics. Enacting such a policy will be a giant step toward bridging the Digital Divide and meeting the 21st Century skills requirements of students and workers to ensure California is globally competitive.

It is important to understand that California has a limited timeframe for the policy "window of opportunity" in order to retain leadership in technological innovation and to keep pace with many global competitors. California – as indicated by the CTBF Report - while competitive with deployment of broadband technology, never the less lags behind much of the world in implementing an ICT Digital Literacy Policy.

APPENDIX

ICT Digital Literacy Policies Reviewed and Referenced

In the preparation for this report and recommendations, the World Summit on Information Society (WSIS) statement of 2005, the European Union Policy and the following country policies were researched and analyzed by KEMPSTER GROUP either in whole or as a component of a larger regional effort in digital literacy:

Angola	Australia	Austria
Azerbaijan	Bangladesh	Belgium
Benin	Bhutan	Botswana
Brunei	Burkina Faso	Burundi
Cameroon	Canada	Cape Verde
Central African Republic	Chad	Cote d'Ivoire
Comoros	Democratic Republic of Congo	Denmark
Djibouti	Equatorial Republic of Congo	Eritrea
Ethiopia	Finland	Gabon
Gambia	Germany	Ghana
Greece	Guinea	Guinea Bissou
India	Indonesia	Ireland
Italy	Japan	Jordan
Kenya	Republic of Korea	Lesotho
Madagascar	Malawi	Malaysia
Maldives	Mali	Mauritania
Mauritius	Mongolia	Mozambique
Nepal	The Netherlands	New Zealand
Niger	Nigeria	Norway
Pakistan	Philippines	Portugal
Rwanda	Saudi Arabia	Senegal
Samoa	Seychelles	Singapore
Slovenia	South Africa	Spain
Sri Lanka	Sudan	Swaziland
Sweden	Tanzania	Thailand
Togo	Uganda	United Kingdom
United States	Uzbekistan	Viet Nam
Zambia		

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The following key resources were used for this report, and are referenced on the following pages in order to provide a detailed illustration of national initiatives and policy approaches.

World Summit on Information Society (WSIS) International ICT Digital Literacy Policies:

http://portal.unesco.org/ci/en/files/20891/11364818989Beacons_of_the_Information_Society_The_Alexandria_Proclamation_on_Information_Literacy_and_Lifelong_Learning.doc/Beacons%20of%20the%20Information%20Society%20The%20Alexandria%20Proclamation%20on%20Information%20Literacy%20and%20Lifelong%20Learning.doc

(Adopted in Alexandria, Egypt at the Bibliotheca Alexandrina on 9 November 2005).

NOTE: The **European Union** and its specific focus on ICT Digital Literacy are separately referenced. It is considered by many observers and experts to have the most comprehensive strategies for addressing ICT Digital Literacy. It can serve as a model of best practices for California in efforts to address the need for ICT skills and literacy benchmarking and assessment.

<http://ec.europa.eu/enterprise/ict/policy/ict-skills/es-br.pdf>

(Adopted December 18, 2002; Continuing Implementation and Ongoing)

Australia:

http://www.dbcde.gov.au/data/assets/pdf_file/20457/New_SFIE_July_2004_final.pdf

(Adopted by the Australian Government in July 2004; Continuing Implementation and Ongoing planning for sector focus, e.g., education, government, etc.)

Bangladesh:

(Source: <http://www.sdnbd.org/sdi/issues/IT-computer/itpolicy-bd-2002.htm>)

(Adopted by the Ministry of Science and Information & Communication Technology and Government of the People's Republic of Bangladesh in October 2002; Continuing Implementation as part of the National Development Plan.)

Finland:

http://www.vnk.fi/julkaisukansio/2006/tietoyhteiskuntaneuvosto/A_Renewing_Human-centric_and_Competitive_Finland_net.pdf

(Adopted by the Finnish Government as part of the implementation of Finnish Government's Information Society Programme. September 2006; Continuing Implementation.)

Japan:

Sources: http://www.cicc.org.sg/Seminar/Japan's_IT_Strategy.pdf

http://www.kantei.go.jp/foreign/it/network/0122full_e.html

<http://unpan1.un.org/intradoc/groups/public/documents/apcity/unpan002771.pdf>

http://www.apricot.net/apricot2005/slides/C3-4_3.pdf

e-Japan Strategy

(e-Japan Strategy declared by Prime Minister Mori on September 21, 2000)

e-Japan Strategy II

(Adopted July 2003)

e-Japan Strategy II Acceleration Package

(Adopted February 2004)

IT Policy Package-2005

The Clarification of Important Measures

(Adopted February 2005)

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Jordan:

<http://www.reach.com.jo/Downloads/R4/REACH%204.0.pdf>

REACH 4.0

Strategies for Jordan's ICT Development

(Final Report adopted January 2004; Continuing Implementation)

Korea:

<http://siteresources.worldbank.org/INTEGOVERNMENT/Resources/NoteKoreaICT.doc>

Informatization Promotion Act

(Adopted in 1995)

First Master Plan for Informatization Promotion

(Adopted in 1996)

CYBER KOREA 21

(Adopted in 1998)

e-KOREA VISION 2007

(Adopted in 2003)

New Zealand:

http://www.minedu.govt.nz/web/downloadable/dl11734_v1/web-version---ict-strategic-framework-for-educatio.pdf

http://www.tki.org.nz/r/literacy_numeracy/litnum_stra_e.php

Report of the Literacy Taskforce

(Adopted in 1999; Continuing Implementation)

ICT Strategic Framework for Education 2006–07

SUPPORTING LEARNING IN A CONNECTED SECTOR THROUGH THE SMART USE OF ICT

(Adopted November 2006; Continuing Implementation)

Saudi Arabia:

<http://css.escwa.org.lb/ICTpolicymaking/5.pdf>

INFORMATION AND COMMUNICATIONS TECHNOLOGY (ICT) POLICY STATEMENT

(Adopted for Implementation in 2006; Continuing Implementation)

Kentucky Department of Education:

<http://www.education.ky.gov/KDE/Instructional+Resources/Curriculum+Documents+and+Resources/Academic+Expectations/Academic+Expectation+116.htm>

Kentucky Technology Standards Academic Expectation 1.16

(Adopted June 2001; Updated as of October 23, 2007; Continuing Implementation)

Iowa Department of Education:

<http://www.iowa.gov/educate/content/view/263/404/>

Career & Technical Education Standards and Benchmarks

(Adopted 1992; Continuing Implementation)

Iowa CONTENT STANDARDS and BENCHMARKS Information Technology

(Adopted in 2001; Continuing Implementation)

New Hampshire Department of Educational Technology:

<http://www.nheon.org/oet/standards/ICTLiteracy.htm>

New Hampshire ICT Literacy Standards for K-12 Students

(Adopted and Effective on July 1, 2005 Continuing Implementation)

World Summit on Information Society Policy Statement

INTERNATIONAL ICT DIGITAL LITERACY POLICIES



BEACONS OF THE INFORMATION SOCIETY

THE ALEXANDRIA PROCLAMATION ON INFORMATION LITERACY AND LIFELONG LEARNING

Celebrating this week's confirmation of the site of the Pharos of Alexandria, one of the ancient wonders of the world, the participants in the High Level Colloquium on Information Literacy and Lifelong Learning held at the Bibliotheca Alexandrina on 6-9 November 2005 proclaim that information literacy and lifelong learning are the beacons of the Information Society, illuminating the courses to development, prosperity and freedom.

Information Literacy lies at the core of lifelong learning. It empowers people in all walks of life to seek, evaluate, use and create information effectively to achieve their personal, social, occupational and educational goals. It is a basic human right in a digital world and promotes social inclusion of all nations.

Lifelong learning enables individuals, communities and nations to attain their goals and to take advantage of emerging opportunities in the evolving global environment for shared benefit. It assists them and their institutions to meet technological, economic and social challenges, to redress disadvantage and to advance the well being of all.

Information literacy

- comprises the competencies to recognize information needs and to locate, evaluate, apply and create information within cultural and social contexts;
- is crucial to the competitive advantage of individuals, enterprises (especially small and medium enterprises), regions and nations;
- provides the key to effective access, use and creation of content to support economic development, education, health and human services, and all other aspects of contemporary societies, and thereby provides the vital foundation for fulfilling the goals of the Millennium Declaration and the World Summit on the Information Society; and
- extends beyond current technologies to encompass learning, critical thinking and interpretative skills across professional boundaries and empowers individuals and communities.

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Within the context of the developing Information Society, we urge governments and intergovernmental organizations to pursue policies and programs to promote information literacy and lifelong learning. In particular, we ask them to support

- regional and thematic meetings which will facilitate the adoption of information literacy and lifelong learning strategies within specific regions and socioeconomic sectors;
- professional development of personnel in education, library, information, archive, and health and human services in the principles and practices of information literacy and lifelong learning;
- inclusion of information literacy into initial and continuing education for key economic sectors and government policy making and administration, and into the practice of advisors to the business, industry and agriculture sectors;
- programs to increase the employability and entrepreneurial capabilities of women and the disadvantaged, including immigrants, the underemployed and the unemployed; and
- recognition of lifelong learning and information literacy as key elements for the development of generic capabilities which must be required for the accreditation of all education and training programs.

We affirm that vigorous investment in information literacy and lifelong learning strategies creates public value and is essential to the development of the Information Society.

This was adopted in Alexandria, Egypt at the Bibliotheca Alexandrina on 9 November 2005.

http://portal.unesco.org/ci/en/files/20891/11364818989Beacons_of_the_Information_Society_The_Alexandria_Proclamation_on_Information_Literacy_and_Lifelong_Learning.doc

The European Union: A Best Practices Model for California

Putting Europe at the forefront of international competitiveness is one of the greatest and most urgent challenges for the European Union. To reach this goal, information and communication technologies and their productive usage will have to play an important role, as an enabler of innovation and to streamline business processes. This calls for well-trained people. IT digital literacy needs to be strengthened across all sectors and professional qualifications in order to use information and communication technologies effectively to enhance productivity and thus stimulating growth and employment.

The political challenge of an "Information Society for ALL" can not be tackled in isolation. There is not only competition for talented people between different business sectors but also between different regions and countries. Europe, according to planning documents and reports, must be as a whole an attractive place to work and to live, in order to attract people who can drive the European Union's economies.

The 2002 report, **E-BUSINESS AND ICT SKILLS IN EUROPE**, set out to show that numerous initiatives already existed at the national, regional or industrial level. However, the report strongly suggested that new forms of cooperation between the different stakeholders are needed. Schools and universities will have to adapt their curricula but at the same time more efforts have to be undertaken to train people and to upgrade their skills on a continuous basis.

The message was stark - Europe will be held back because it did not have enough skilled people. But they not just talking about the ICT professionals – people in all sectors of employment are expected to acquire ICT skills (with less than a third of them having received any ICT training at all). Yet at the same time there was identified a growing "ICT poverty gap", with women, the unemployed and low income groups tending to miss out even further on ICT training and access, and therefore on the chance to improve their lot. The question posed by the European Union was, "Can we afford not to equip everyone with the skills needed to operate in the knowledge society?"

Fewer and fewer jobs can be filled with only a basic education. Skills to operate computers are vital, and yet the providers of literacy and skills – of reading, writing and arithmetic capabilities – are struggling to keep pace.

Four main challenges in the ICT field must be faced if the EU is to achieve its objective of becoming the world's leading knowledge economy by 2010:

Closing the skills gap

To close the skills gap, we need to respond to the needs of industry. Manpower is needed at all levels: from IT support staff, to sales staff, project leaders, engineers, educators, managers. People who combine technical know-how with business acumen; matching qualifications and skills profiles with the needs of e-Europe – that is the challenge.

Demographic shifts and life long learning

Newly skilled young people entering the labor market will *not be enough* to provide the skills that e-Europe needs. Hence businesses must focus on motivating, retaining and re-equipping current staff, and ensure that today's and tomorrow's workers are capable of remaining in the labor market throughout a full working life, and not drift away in their 50's. Europe must also show itself to be more open to the outside world, using the skills of immigrants to plug some of the ICT gaps.

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Investing in children – tomorrow's workforce

We must invest in our labor force of the future: young people. Full access for schoolchildren to computers, multimedia tools and to the Internet is paramount.

Achieving an interconnection of PCs in schools of one for every fifteen pupils by the end of 2003 (as called for by the Barcelona European Council) is a step along this road. But providing hardware is only half the battle. We must also encourage the use of ICTs as a tool and a resource across all subject areas and make sure that teachers are equipped with the right skills.

Strengthening gender equality in the ICT sector

Even though men and women use computers to more or less the same degree at work, the differences arise when it comes to jobs demanding higher levels of ICT education. Especially when it comes to ICT specialists and jobs that are traditionally seen as a male preserve, such as engineering and technical support. We need to step up action to boost the number of women in these areas, from the shop floor to senior management, and encourage more girls and young women into ICT training. At the moment only around 1 in 5 ICT students are women. Until this changes, companies and society are losing out on a valuable resource.

Meeting these challenges means a substantial shift in our priorities to provide the right incentives to people and focus to invest in education, skills and competencies. It also involves a review of how public expenditure is being used to best effect. The EU's resources in terms of Structural Funds have a major role to play here, and it will be important that the focus of these funds in the coming years (particularly with an enlarged EU in prospect) takes sufficient account of the need to invest more substantially in human resources.

At the European Council in March 2000 in Lisbon, the Heads of State and Government of the European Union set the ambitious target for the EU to become, by 2010, *"the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion"*. The intelligent use of ICT and of e-business skills ("e-skills") is a major enabler to increase productivity and competitiveness, which are at the heart of the Lisbon strategy. This requires a skilled and adaptable labor force.

The EITO 2001 Yearbook and several studies commissioned by the ICT industry highlighted the fact that the European industry is suffering from a significant e-skills gap. This has initiated, at different levels, a policy debate about how to better promote e-skills in Europe, in order to fully reap the potential benefits of modern information and communication technologies. As a follow-up of the informal meeting of the Council of Ministers responsible for telecommunications and for employment in Luleå in February 2001, a specific Task Force on skills and mobility was set-up in June 2001. Based on their report of December 2001, the Commission adopted in February 2002 an Action Plan for skills and mobility".

In this Action Plan, the European Commission acknowledges the evidence of a *"shortage in ICT occupations and sectors"* as *"one of the biggest concerns of enterprises"*. Although the current business cycle and the economic downturn have somewhat alleviated this problem, the lack of skilled professionals in the e-business and ICT area seems to be a pertinent issue. The e-skills gap may no longer be as threatening as perceived two years ago, however, there is undoubtedly still an ICT skills mismatch as well as the risk that the current situation may result in future problems. This would be the case if the current slowdown of growth in the ICT sector were to result in less effort to further improve the e-skills base. It should be recognized that the use of ICT and e-business is still growing, in particular in user industries that will in future need more ICT experts than ever.

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The challenge is to develop, nurture and attract talents as well as to strengthen human capital investment. The current main issues encompass, on the demand side, clearly defining what e-business and ICT skills are needed, thereafter enabling forecasting and scenarios exercises.

On the supply side, the challenges lie in the provision of a sufficient volume of skilled labor, with accurate and up-to-date knowledge that matches the demand requirements. Last but not least, the supply of talented and skilled people needs to be scalable and sustainable over-time.

In the scope of the eEurope GoDigital initiative, the Commission has established an ICT Skills Monitoring Group² with representatives of Member States to better understand the nature of the proclaimed e-skills gap and to identify good policy responses to improve the availability of ICT skills.

The problem of e-skills: An area of mixed responsibilities

Industry has a clear role in the provision of training and educating the workforce to address the e-skills gap. However, the responsibility does not just fall on industry, and there are already a number of joint initiatives taking place between government, education and the private sector reinforcing the importance of collaboration and coordination of approach in order to improve sustainability at national and European levels. The public sector also has its own policy schemes underway across Europe indicating that the public and the private sector understand that the responsibility lies with a number of stakeholders: industry, government, academia and the social partners.

Key challenges in overcoming the e-skills gap

	ICT Industry	Key User Industries	All Business Sectors
Funding	<ul style="list-style-type: none"> R&D New Product development 	<ul style="list-style-type: none"> Training Awareness Demonstration Adopting new applications 	<ul style="list-style-type: none"> Training Awareness
Education	<ul style="list-style-type: none"> New Degree Courses New Curriculum Development 	<ul style="list-style-type: none"> Targeted vocational education and training curricula Certification On the job training schemes 	<ul style="list-style-type: none"> Basic work-related education Lower level certification, e.g., European Computer Driving License (ECDL)
Skills	<ul style="list-style-type: none"> High science and technology skills Ability to constantly update on new technological developments New people, new skills 	<ul style="list-style-type: none"> Applications skills More advanced ICT skills 	<ul style="list-style-type: none"> On the job training schemes to deliver general ICT skills Digitally literate school leavers
Social needs	<ul style="list-style-type: none"> Social curricula Information society implications 	<ul style="list-style-type: none"> Information Society implications Global markets 	<ul style="list-style-type: none"> New target groups
Forecasting	<ul style="list-style-type: none"> Forecasting of ICT professional skills market 	<ul style="list-style-type: none"> Forecasting of ICT professional skills market Forecasting of ICT user skills 	<ul style="list-style-type: none"> Forecasting of ICT user skills needs

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Only if all of the different priorities of the 'industry groups' were properly addressed would the e-skills gap no longer be a major issue. The breadth of coverage of the programmes identified as a result of the research indicates that this is a complex domain with many different actors involved: the EU, Member States, industry, the social partners and individuals. There are also issues of social development, culture and private versus public financing to consider. Finally there are numerous tools which are being used such as education and training, incentives, immigration and forecasting.

Although there are many differences between the Member States, a set of common principles can be identified:

- Policies aim to establish an "enabling" environment that encourages investment in human resources development and training by all stakeholders;
- Policies aim to develop a framework for human resources development and training that is relevant to countries' social and economic context;
- Member States are keen to ensure equal access to human resources development of training for all, irrespective of socio-economic and income status, ethnic origin, sex, age, income level etc.;
- There is a drive to develop partnerships between various stakeholders in the delivery of learning, education and training programmes.

A thread that runs through these common principles is that the policies are mainly economic, educational, or social in origin and therefore a matrix can be drawn up with one dimension being the actors and the other being the types of tools that are employed.

EU Matrix of Tools and Actors

	Economic	Educational	Social
EU	<ul style="list-style-type: none"> • The creation of common skills, profiles and occupational frameworks 	<ul style="list-style-type: none"> • Encourage lifelong learning • Enhance understanding of national qualification structures across Europe to facilitate mobility 	<ul style="list-style-type: none"> • Promote social cohesion • Equal opportunities
Member States	<ul style="list-style-type: none"> • Work with the EU to develop a common skills framework based on existing best practice in Member States 	<ul style="list-style-type: none"> • Add ICT to school education • Improve qualifications for ICTs • Increased training provision for workforce development 	<ul style="list-style-type: none"> • Better recognition of professional experience and vocational training • Provide incentives for retraining employees • Encourage under-represented groups to acquire e-skills (women, long-term unemployed, the disabled)
Industry	<ul style="list-style-type: none"> • Work with government to provide up to date meaningful statistics on the skills gap 	<ul style="list-style-type: none"> • On the job training schemes 	<ul style="list-style-type: none"> • Work with Member States and Social partners to train the long term unemployed and other target groups in key e-skills for business
Colleges and Universities	<ul style="list-style-type: none"> • Work with government and industry to provide skills profiles needed for the work force in Europe 	<ul style="list-style-type: none"> • Provision of e-learning • Provision of new qualifications 	<ul style="list-style-type: none"> • Foundation courses and conversion courses • Promotion of the concept of lifelong learning
Social Partners	<ul style="list-style-type: none"> • Work with the EC and Member States to support economic policies 	<ul style="list-style-type: none"> • Increased decentralized workforce training provision 	<ul style="list-style-type: none"> • Social dialogue between Member States, industry and the EC to encourage new ways of working
Individuals	<ul style="list-style-type: none"> • Willingness to seek employment in ICT related jobs • Flexibility in employment 	<ul style="list-style-type: none"> • Willingness to engage with lifelong learning • Ambition to learn new methods and ICT related skills 	<ul style="list-style-type: none"> • Acceptance of ICT and use of ICT in social environments and family groups

(Source: <http://ec.europa.eu/enterprise/ict/policy/ict-skills/es-br.pdf>)

Samples of ICT Policy Initiatives from Other Countries

AUSTRALIA

Australia has already made significant strides towards an open, adaptable economy and society in recent years, but continued success cannot be taken for granted. Further economic growth and community development are required to meet future challenges. Increasingly, we will need to create and mobilize new capabilities and bring them to bear in a focused way. This will be an innovative, problem-solving society: in other words, an 'information' economy and society.

Australia's broad objectives for the information economy are:

- to promote social cohesion by ensuring that particular sectors, groups of Australians and regions are not left behind
- to secure Australia's information economy against external and internal threats and to promote Australia's interests in the emerging global information economy
- to remove barriers to information economy development
- to make government an exemplar in the use of ICT to improve citizen engagement, efficiency and effectiveness of service delivery.

These objectives translate into the Australian Government's **four strategic priorities and sixteen associated strategies for the information economy**. (Note: The latter are not included herein.)

1. Ensure that all Australians have the capabilities networks and tools to participate in the benefits of the information economy.
2. Ensure the security and interoperability of Australia's information infrastructure and support confidence in digital services.
3. Develop Australia's innovation system as a platform for productivity growth and industry transformation.
4. Raise Australian public sector productivity, collaboration and accessibility through the effective use of information, knowledge and ICT.

(Source: http://www.dbcde.gov.au/_data/assets/pdf_file/20457/New_SFIE_July_2004_final.pdf)

BANGLADESH

National Information and Communication Technology (ICT) Policy

Vision

This Policy aims at building an ICT-driven nation comprising of knowledge-based society by the year 2006 [Policy articulated in 2002.] In view of this, a country-wide ICT-infrastructure will be developed to ensure access to information by every citizen to facilitate empowerment of people and enhance democratic values and norms for sustainable economic development by using the infrastructure for human resources development, governance, e-commerce, banking, public utility services and all sorts of on-line ICT-enabled services.

Objectives

- In order to give a thrust to the ICT sector and expeditious development of Software industry and its export required infrastructural facilities and legal framework will be created.
- Provide effective incentives for development of ICT sector to both local and foreign entrepreneurs;
- Develop an efficient ICT infrastructure that provides open access to international and national network;
- Promote and facilitate use of ICT in all sectors of the economy for transparency, good governance and efficiency improvement;
- Establish legislative and regulatory framework for ICT issues like IPR, data security and protection, digital signature, e-Commerce, ICT education etc. as well as to ensure quality ICT education provided by different private organizations
- Set up national databases that are reliable and easily accessible to all the people of the country;
- Promote use of ICT by providing special allocations for ICT project implementation in the public sector. Train the decision makers in ICT use and promote an ICT culture.
- Develop a large pool of world class ICT professionals to meet the needs of local and global markets
- Set up a very high quality ICT institution to continuously promote and foster ICT Industry;
- Enact Laws and Regulations for uninterrupted growth of ICT, in conformity with World Trade Organization (WTO) stipulations.

POLICY PREAMBLE – Excerpt on Training and Human Resources Development

Information Communication Technology (ICT) encompasses the broad fields of data/information processing, transmission and communications by means of computer and telecommunication techniques and these modern tools are being increasingly used for organizational/personal information processing in all sectors of economy and society. This document presents the policy guidelines for the development of the ICT sector in Bangladesh.

A dependable information system is essential for efficient management and operation of the public and private sectors. But there is a shortage of locally generated information needed for efficient performance of these sectors. In order to meet this objective, ICT use in every sector shall have to be accelerated in terms of information generation, utilization and applications. Considering the gravity and importance of ICT Hon'ble Prime Minister has already declared ICT as the thrust sector.

Many nations have taken advantage of the opportunities afforded by ICT within a policy framework, laid down guidelines and proceeded with the formulation of a national ICT strategy as a part of the overall national development plan. Bangladesh intends to use ICT as the key-driving element for socio-economic development.

Training and Human Resources Development

Bangladesh must prepare itself to compete effectively in the global ICT market. As the demand for skilled manpower in ICT is growing world-wide, the country needs to produce a large number of ICT professionals. The specific policy statements are:

- Widespread introduction of ICT education in public and private educational institutions is a prerequisite for producing skilled ICT manpower. Facilities shall be built to promote ICT training and computer aided training at all levels of education including Primary Schools and Madrasahs. Donor agencies, non-government organizations and other development partners of the country shall be encouraged to help build the necessary capacity in this area.
- Universities, Bangladesh Institutes of Technology and colleges, both in the public and private sectors, shall be strengthened to produce ICT graduates in four-year Computer Science and/or Engineering courses. Necessary resources will be allocated to these institutions.
- Out of the three Science and Technology universities proposed in the Fifth Five-Year Plan, one will be established as center of excellence in ICT by giving higher allocation of resources.
- Establish multimedia institutes up to district level to start with to produce skilled human resources to exploit the opportunity offered by the growing multimedia-market.
- Diploma and Trade Certificate in ICT will be offered in both public and private institutes including Polytechnics. The continual skill upgrading of existing professionals working in public and private sectors shall be ensured by in-service training programmes.
- The shortage of trained and qualified teachers and trainers for ICT training is a bottleneck to the HRD plan. To address the issue, IT-Capacity-Building of the Teachers Training Institutes (TTI) including TTCs, NAPE, PTI will be taken up. To teach the teachers and trainers, intensive post-graduate diploma courses will be introduced in TTIs. Training programmes to train and retrain them periodically to keep them up-to-date with the technological progress in the area of ICT will be introduced. ICT literacy will be a desirable requirement in the recruitment and selection of teachers. Divisional training centers of BCC will provide TOT (Training for the Trainers) to build up sufficient number of skilled trainers.
- As it would be difficult to train teachers in ICT in large number using the present infrastructure, deploy virtual ICT trainers wherever possible. CD and web based courseware development and use shall be encouraged to promote computer-aided education at all level of education.
- To address the issue of deficiency in English and mathematics education, a crash programme shall be taken up to train teachers. To ensure standard and quality of ICT education, a national certification and accreditation system shall be developed and implemented.
- Take up programmes to develop quality ICT professionals and skilled personnel to ensure success in the global software and ICT-enabled services market. Encourage and support formal and informal sector to adopt internationally accepted standards in training programs and to introduce globally acceptable standards.
- Use the potential of ICT for delivery of distance education to help stretch the country's limited teaching resources and ensure quality education to all.
- Qualified and skilled teachers will be brought in from abroad in the fields where local teachers are not available.
- Syllabus and Course Curricula for all levels of Computer Science training will be updated continuously

(Source: <http://www.sdnbd.org/sdi/issues/IT-computer/itpolicy-bd-2002.htm>)

FINLAND

The National Knowledge Society Strategy 2007–2015

During 2006, a National Knowledge Society Strategy for 2007-2015 has been drafted as part of the implementation of Finnish Government's Information Society Programme.

The Strategy has been drafted to support the emergence of a Finland phenomenon, in other words, the transformation of Finland into an internationally attractive, human-centric and competitive knowledge and service society. Development of skills and creativity, bold renewal of structures and operating models, and efficient utilization of technology will make this possible, even under conditions of increasing global competition.

Technology has matured as a facilitator of broad societal changes, the realization of which requires the reform of structures and operating models in conjunction with the implementation of technology.

Knowledge is an even more important resource in our society, which, with the help of technology, can be utilized more effectively than ever before. The strategic priority has shifted from being a society that utilizes ICT to one that generates knowledge-based growth. The broad utilization of information provides Finland with the opportunity to function as a global reformer and develop new skills and business. This will require seamless cooperation between different stakeholders and the development of ideas into products and services.

Strategic Guidelines

In order to achieve the set targets, the strategic work defined the main projects for 2007- 2011, through which the Finland phenomenon will be created. In addition to the main projects, the Strategy includes 72 proposals for measures intended to ensure Finland's transformation from an industrial society to an internationally attractive, human-centric and competitive knowledge and service society. The Strategy also includes a concrete implementation programme.

- Initiation of a policy programme for reforming public sector service structures
- Increasing connection speeds for information networks and ensuring the interoperability of the information society infrastructure
- Ensuring the prerequisites for lifelong learning
- Reforming the rules for working life and developing leadership and supervisory work
- Reforming the innovation system
- Further development of the copyright system
- Promotion of digitalization of business in SME's
- Influencing internationally, especially at the EU level, and close cooperation with Asian countries and neighboring regions

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A VISION FOR 2015

A renewing, human-centric and competitive Finland will:

- successfully reform its structures, operating models, services and product offering
- utilize throughout society the product, process and service innovations made possible by digitalization, the resulting changes of which will be reflected in society as competitiveness, success, high service quality and well-being
- encourage creativity and innovativeness as well as personal growth throughout society
- promote social and regional equality
- cooperate with the private and public sector and boldly cross over traditional sector borders
- do interactive and target-oriented international cooperation
- implement a strategy-oriented operating model in innovation activities, in which education, research and product development and the utilization of their results form a balanced approach
- support innovative and market-oriented research and development activities
- invest in everyday innovations and content and services that make daily life easier for people and organizations
- export successfully technology, product, service and process innovations to global markets
- effectively apply international technology, product, service and process innovations in the private and public sectors
- create opportunities for all members of society to utilize their own potential as fully as possible and appreciate various types of expertise
- offer citizens opportunities to influence the development of society and express themselves
- promote tolerance and interaction between cultures

Strategic intent 2015

ICT will be inseparably linked to citizens' and organizations' daily life in 2015. Knowledge, expertise and technology will be seen as strategic resources. They will be broadly utilized in business and public administration with the target of continuous reform, improving services, increasing success, and maintaining and developing competitiveness. Knowledge is a key production factor for the national economy, and production of intangible capital is one of the foundations of Finland's economy. With the development of productivity and competitiveness, individuals' well-being has improved and exclusion decreased.

Responsibilities of the actors in information society development

ALL STAKEHOLDERS

- Implementation of the National Knowledge Society Strategy
- Switching to information society structures, processes, operating models and services
- Maintenance of citizens' and employees' competence and well-being
- Promoting competitiveness
- Cooperation between the public and private sectors
- Broad utilization of ICT when developing operations
- Leadership development
- International influencing

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POLITICAL ACTORS

- Creation of a national strategic intent
- Inclusion of information society policy in the Government programme
- Ensuring resources

CENTRAL GOVERNMENT

- Ensuring a functional operating environment (incl. legislation)
- Development and implementation of good practices in Government activities (forerunner)
- Promoting output efficiency
- Interoperability and standardization
- Investment in research and development activities
- Maintenance of the required knowledge in cooperation with enterprises and the third sector
- Ensuring quality basic education

LOCAL GOVERNMENT

- Development and implementation of good practices in municipal activities (forerunner)
- Promoting output efficiency
- Ensuring a functional operating environment for local enterprises
- Using basic services to ensure people's quality of life
- Ensuring quality basic education

BUSINESS AND INDUSTRY

- Development of innovative new technical solutions and services as well as rapid implementation of solutions that improve efficiency in production and services
- Investment in research and development activities
- Internationalization
- Interoperability and standardization

BUSINESS AND LABOUR ORGANISATIONS, ASSOCIATIONS AND THE THIRD SECTOR

- Development of knowledge in cooperation with Government and enterprises

INDIVIDUALS

- Ensuring personal expertise
- Active and responsible citizenship

INTERNATIONAL FORUMS

- Creation of global consensus and vision
- Interoperability and standardization

(Source: http://www.vnk.fi/julkaisukansio/2006/tietoyhteiskuntaneuvosto/A_Renewing_Human-centric_and_Competitive_Finland_net.pdf)

JAPAN

Japan has had an ongoing commitment for several years to the advancement of ICT Digital Literacy. The 'e-Japan Strategy' was announced as a national strategy for information technology (IT) on 22 January 2001¹⁵. e-Japan envisions a society "where everyone can actively utilize IT and fully enjoy its benefits". To achieve this goal, government must "establish an environment where the private sector, based on market forces, can exert its full potential and make Japan the world's most advanced IT nation within five years".

The specific goals of the e-Japan strategy are to:

- Build an ultra high-speed Internet network and provide constant Internet access at the earliest date possible;
- Establish rules on electronic commerce
- Realize an electronic government; and
- Nurture high-quality human resources for the new era.

On 29 March 2001, the 'e-Japan Priority Policy Programme' was adopted to realize the e-Japan Strategy and clarify all measures that the government should rapidly implement by 2006. The roles of the private and public sectors are detailed in the Programme: the private sector is to play the leading role in the area of IT. The Programme also identifies five areas for action:

- Formation of the world's most advanced information and telecommunications networks;
- Promotion of education and learning as well as development of human resources;
- Facilitation of electronic commerce;
- Digitization of the administration and application of IT in other public areas; and
- Ensure security and reliability of advanced information and telecommunications networks.

'e-Japan Strategy II', launched in July 2003, aims to create a "vibrant, safe, impressive and convenient" society with the active use of IT. The new strategy proposes to implement leading measures in seven areas that are closely related to the lives of the people: medical treatment; food; life; small- and medium-sized enterprises; finance; knowledge; employment; and government service. The strategy also seeks to advance the development of a new IT social infrastructure, which is essential for the sophisticated use of IT during this second phase. Japan also launched an IT use promotion strategy – 'Building A New, Japan-Inspired IT Society' – when it discovered that despite low access fees to high-speed Internet, availability of lines outstripped subscription.

The government also launched its 'e-Project' to provide a glimpse of its vision of Japan as "the world's most advanced IT nation".

(Sources: [http://www.cicc.org.sg/Seminar/Japan's IT Strategy.pdf](http://www.cicc.org.sg/Seminar/Japan's_IT_Strategy.pdf)
http://www.kantei.go.jp/foreign/it/network/0122full_e.html
<http://unpan1.un.org/intradoc/groups/public/documents/apcity/unpan002771.pdf>
http://www.apricot.net/apricot2005/slides/C3-4_3.pdf

JORDAN

REACH: Strategies for Jordan ICT Development

In 1999, a strategy was initiated to transform Jordan into a knowledge society. The REACH initiative was published by Intaj, the IT Association of Jordan in mid-2000 followed by the REACH 2.0, 3.0 and finally the REACH 4.0 report in 2004; thus presenting a national strategy for Jordan to develop an export-oriented information technology services sector, capitalizing on its core human capital advantage.

The REACH Initiative is a comprehensive framework that embraces actions in the following areas:

- **R**egulatory Framework
- **E**nabling Environment and Infrastructure
- **A**dvancement of National IT Programs
- **C**apital and Finance
- **H**uman Resource Development

VISION

Jordan shall become a regional IT leader and internationally recognized exporter of IT products and services, exploiting its core human capital advantages. The key to success is the central role of the private sector, which shall spearhead the sustained entry of the sector into international markets.

It shall also require strong and active support from all levels of Jordan's Government to create a positive regulatory and promotional environment for IT success now and into the future. This IT industry -Government of Jordan partnership is the key to sustained growth and creation of economic benefits for all Jordanians.

Two aspects of the underlying philosophy of the Vision are at its core:

- **Private sector leadership:** By adopting this philosophy, Jordan will not only achieve success, but will distinguish itself from most other countries of the region that continue to embrace ineffective Government-dominated approaches.
- **Partnership with the Government:** Active support of the GoJ to create a positive regulatory framework and actively support the IT industry is essential.

CONSENSUS DOCUMENT

STRATEGIC THRUSTS

ICT Industry Development

The capabilities of existing IT services firms and the sector as a whole need to be upgraded to effectively compete in regional and global markets.

Policy and Regulatory Strengthening

Success will require the establishment of a supportive regulatory framework for the IT industry, and streamlining of procedures.

Human Resource Development

Long-term competitiveness depends on the ability of Jordan's educational initiatives to produce the quality and quantity of IT professionals that meet the requirements of the marketplace, and to open equal opportunities for both men and women.

Government Support

Total commitment and active Government leadership is required to stimulate, facilitate and promote the software and IT services sector.

Capital and Financing

Innovative mechanisms are required to provide funding to the industry and facilitate Initial Public Offerings (IPOs) of successful companies.

Infrastructure Improvement

The development of telecommunications and purpose-built physical facilities to increase the competitiveness of the IT industry, and the productivity of Jordanian IT workers.

Integrated actions in each of these areas, undertaken in tandem by the IT Industry, the government of Jordan, and a wide range of stakeholders, are vital to ensuring the success of the REACH Initiative.

(Source: <http://www.reach.com.jo/Downloads/R4/REACH%204.0.pdf>)

KOREA

Since the mid 1990s, the Korean government has established three master plans for the development of the information society: 1) the Informatization Promotion Act(1995) followed by the First Master Plan for Informatization Promotion(1996), 2) CYBER KOREA 21(1998), 3) e-KOREA VISION 2007(2003). In particular, CYBER KOREA 21 was one of the most important policies to cope with the changing environment as a result of the Asian financial crisis. Through these plans, Korea came one step closer to a knowledge-based society with the construction of an advanced information infrastructure, the introduction of various information systems in public services and in the private sector, as well as growth in the overall IT industry.

Cyber Korea 21

CYBER KOREA 21 refers to Korea's comprehensive plan to transform itself into a knowledge-based society where everyone can have easy access to the ever-shifting tide of information anywhere, anytime.

In the coming "knowledge-based society," where information and knowledge are the prime sources of added value, government, businesses, and individuals are called upon to join the information revolution so that they may freely acquire useful information, process it, and utilize it to their best advantage. To achieve this, CYBER KOREA 21 envisages soon building a nationwide ultra-high-speed information infrastructure in what amounts to an information superhighway of the knowledge-based society and, building on this momentum, pushing ahead with informatization throughout the government and private sector. Leveraging an advanced broadband telecommunications network and information technology will not only improve productivity and transparency across the government and society at large, but will also allow current industries to develop into knowledge-based industries. The unemployment problem should be resolved by fostering new industries, such as e-commerce, that effectively absorb downsized labor forces in society.

The Korean government's efforts to create an information-based society were strengthened with the announcement of *Cyber Korea 21*. The purpose of *Cyber Korea 21* is to realize the vision of becoming a knowledge-based economy under the guidance of the government-led information promotion committee.

The first initiative is to improve the quality of life for the general public. To do this, the government is providing PC units to schools.

The second initiative involves general steps to ensure the competitiveness of Korean industries as a whole, such as support for the construction of e-commerce system in steel, shipbuilding and other traditional industries.

The third initiative is to establish an electronic document distribution system to be used by administrative bodies.

Status of Korea's ICT development

Broadband and Mobile communications

Korea ranked first in the world in terms of broadband Internet penetration rates as of 2002 and 4th in terms of Internet user rates as of 2003. Over 65% of Koreans are now utilizing the Internet in their everyday lives. And nearly 12 million Korean households or 77% of total households are connected to the broadband Internet at the minimum of 1-Mbps. Broadband Internet service is becoming a universal service to its people.

These facts will allow Korea to be recognized as one of the countries that have reached the highest level of informatization: Korea was ranked 4th in the Digital Access Index survey by conducted by the ITU in 2003.

Korea has the second most advanced technological infrastructure, the largest broadband subscribers, and the second lowest broadband cost in the world, according to the IMD World Competitive Yearbook 2005.

Since the successful and world's first commercialization of the CDMA technology, 76% of the total population, or 36 million people, have subscribed to the mobile service in 2004. Korea is a leading country in CDMA mobile communications, starting the 3rd generation mobile communication service as one of the first countries in the world, with over 14 million mobile Internet subscribers using the 3G services.

ICT industry

The ICT sector has emerged as the single most important economic growth engine. The ICT industry in Korea contributed 41.9% to total economic growth in 2003. ICT's portion of total exports has been steadily growing since the 1990's. In 2004, IT exports amounted to US\$ 74.7 billion, or 29.4% of total exports. Based on broadband networks and information technologies, the country is leading the world particularly in hardware - semiconductor, mobile phones, TFT-LCD, and digital TV. Its global competitiveness has also expanded to some of the software sector, most prominently in the online game industry.

E-government

IT applications are increasingly integrated into government services and Korea's e-government initiative has made steps forward. It was ranked 5th in the UN Global E-Government Readiness Report 2004, as the only nation among top 10 countries, which neither uses English as mother tongue nor belongs to the Nordic countries.

Among others, Korea's e-Procurement service (G2B) has made the country belong to the few countries that have a full-fledged e-government procurement system in place, receiving the First Public Service Award sponsored by the UN in 2003. Currently, more than 400 government forms can be requested over the Internet and the use of mobile phone payment system has exceeded 20% of the total payment in 2004.

E-life -- other ICT applications

Thanks to the world's best IT infrastructure, Korea has made significant progress with many forms of digital technology. In 2004, OECD declared the country's national e-commerce system needed 'no further action required' and suggested Korea's example as a benchmark for other governments. Up to 100,000 students can use high-speed Internet connections simultaneously to take free tutorials for the national aptitude test, which can determine college admissions.

CONSENSUS DOCUMENT

The number of individuals using ICT-related services is also constantly on the rise: the number of subscribers to Internet banking services reached 21 million in 2003; Internet trade accounted for 66% of the total trading as of 2003; market value of e-commerce has rapidly increased from 50 billion KRW in 1998 to 177 trillion in 2003, accounting for 12% of total business transactions.

Success Factors

Focused strategy

Proactive Government

Harmony between government intervention and market economy

Balanced approach in demand and supply

A simultaneous consideration of supply-push and demand-pull was also a key factor. While trying to expand the supply in ICT through building ICT infrastructure nationwide and developing high-end technologies, the government also came up with strategies for the other side of broadband equation - demand creation. The ambitious plan of "ICT training for 10M people" is one of the most notable initiatives among others.

People

Thanks to the traditional emphasis on education, Korea has a high rate of literacy and school enrollment, which are essential prerequisites for the widespread adoption of ICT. Moreover, a large consumer base of technology-savvy Koreans actually helped the rapid deployment of Internet and various new digital services.

(Source: <http://siteresources.worldbank.org/INTEGOVERNMENT/Resources/NoteKoreaICT.doc>)

New Zealand

Digital Strategy

The Digital Strategy is a core element of the Growth and Innovation Framework. New Zealand will be a world leader in using information and technology to realize its economic, social, environmental, and cultural goals, to the benefit of all its people.

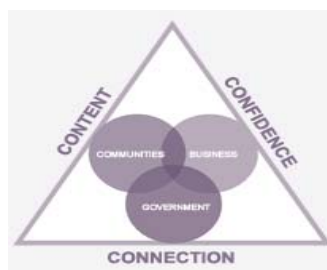
The Digital Strategy is about creating a digital future for all New Zealanders, using the power of information and communications technology (ICT) to enhance all aspects of our lives. The Ministry led a whole-of-government approach to developing the strategy and is now leading the implementation of the strategy. This is a strategy for ensuring New Zealand is a world leader in using information and technology to realise our economic, environmental, social and cultural goals. The Digital Strategy isn't just about technology ... it's about people and their ability to connect to the things that matter to them.

Why we need a Digital Strategy

- promote innovation
- increase productivity
- enrich the quality of lives
- Lifting productivity
- environmental benefits

Transformation through information and communication there is an international consensus on the importance of intellectual input in creating value, underlining the need for investment in education and skills in general, with a special focus on ICT skills and research and development. ICT has changed the face of modern science and technology research, requiring our research organizations to be linked to each other through an Advanced Network that is connected to the rest of the world. Ready access to a safe, secure, and affordable communications infrastructure that enables national and international collaboration is the other half of the equation to take us forward to the Knowledge Society:

Collaboration and partnerships will be essential in implementing the Digital Strategy.



It is important that we keep all the dimensions of the Digital Strategy in line. **Content**, **Connection**, and **Confidence** are the three enablers. Connection is necessary but not sufficient – it simply provides the means. Confidence gives us the skills and a secure online environment, whilst accessing or creating Content provides a compelling reason to make it happen.

CONSENSUS DOCUMENT

Government, business, and communities are the agents of change and their initiatives all impact upon each other. Whilst we set out below some issues that relate specifically to communities and businesses, including not-for-profit organizations, they are clearly interwoven. Since the full benefits of ICT can only be realized when everyone is able to participate, we have emphasized the importance of partnership and collaboration.

This is therefore a document for all New Zealanders. By working together, we can make it happen.

(Source: <http://home.inter.net/takakuwa/search/search.html>)

Literacy and numeracy strategy

With the objective of raising overall achievement and closing the gap between the lowest and highest achievers, particularly in mathematics and English, the Government has set the target that "by 2005, every child aged 9 will be able to read, write and do maths for success". Linked to this goal, the New Zealand Government has launched a literacy and numeracy strategy, which includes:

- ensuring that the (above) goal for 9-year-olds is well understood in the education sector and by parents and the wider community;
- working out the most effective way to measure the progress of individuals and groups towards the goal;
- supporting the best possible teaching of all children;
- ensuring that government interventions to support children's learning in literacy are as effective and efficient as possible;
- providing extra support for programmes through a special proposals pool; and
- encouraging parents and the wider community to support children's learning at school and in early childhood through a public information campaign.

(Source: THE LITERACY TASK FORCE (1999). Report of the Literacy Taskforce. Advice to the Government on Achieving its Goal that "by 2005, every child turning nine will be able to read, write and do maths for success". Wellington: Ministry of Education.

(The literacy and numeracy strategy website is at http://www.tki.org.nz/r/literacy_numeracy/litnum_stra_e.php)

Information and communications technology

The purpose of the ICT Strategic Framework for Education is to provide the mechanism to guide and co-ordinate ICT investment towards the government's vision of improved education outcomes.

The Framework is aligned with, and supports the government's E-government and National Digital Strategies and provides the foundation for effective (e) learning practices to be integrated into New Zealand educational practices.

VISION

To improve learner achievement in an innovative education sector, fully connected and supported by the smart use of ICT.

CONSENSUS DOCUMENT

GOALS

The ICT Strategic Framework for Education seeks to deliver this vision through:

1. A more learner-centered education system transcending organizational boundaries.
2. More informed decision making within the education sector by learners, teachers, parents, communities, public, businesses, researchers, policy makers, and administrators.
3. Increased ease and opportunity of access and reduced compliance costs for all participants.
4. Increased confidence, capability and capacity from the use of ICT by all participants in the education sector.
5. Greater opportunities for the generation, application and sharing of new ideas and technologies.
6. More effective and efficient investment in ICT by education sector government agencies.

These goals will be achieved through:

- Developing a more learner-centered service culture where education agencies and organizations focus on the outcome rather than the technology;
- Recognizing that successful design, development and implementation is as much about people as about technology;
- Interoperability and ease of access to, and between, systems and information where learners can engage as and when required, and decision-making is better informed at all levels;
- Balancing local choice and national direction;
- Coherence through open standards rather than standardization;
- Achieving greater effectiveness and efficiency in the design, development, implementation and use of ICT in supporting education based on a user-focused approach;
- Establishing and maintaining a cooperative culture and communities that support and nurture innovation, creativity and the sharing of ideas and practices;
- Recognizing and accommodating the considerable legacy investment and levels of ICT capability and resource across the Sector.

The ICT Strategic Framework for Education aims to deliver across the following National Digital Strategy components:

Connectivity	Access to a robust national open standards-driven ICT infrastructure for education.
Content	Digital content from a variety of sources, and repositories for many purposes and users to support teaching, learning, research and administration, including support for lifelong learners and preserving New Zealand's digital heritage for future generations of learners.
Confidence & Capability	All New Zealanders have or are developing/acquiring the skills and confidence needed to turn the information into knowledge; collaborative working practices are utilized to deliver education outcomes for all.

The **ICT Strategic Framework for Education** strategy can be accessed via the Ministry of Education website at http://www.minedu.govt.nz/web/downloadable/dl11734_v1/web-version--ict-strategic-framework-for-educatio.pdf

SAUDI ARABIA

PURPOSE OF POLICY STATEMENT

The Ministry of Communications and Information Technology (MCIT) recognizes that all the constituents of the Information and Communication Technology (ICT) sector, particularly domestic and foreign investors, attach great importance to removing uncertainty, creating a favorable regulatory atmosphere, and pursuing a policy of speedy reform to keep pace with the needs of the market, and attract more investment to the ICT sector.

The purpose of this policy statement is to state the policies that have been adopted by MCIT in the past few years, as well as those MCIT plans to pursue over the next few years in the development of the ICT sector in the Kingdom of Saudi Arabia. The Communications and Information Technology Commission (CITC) has ensured that it regulates the ICT sector in accordance with these policies and the existing legal and regulatory framework that has been established for the sector.

ICT VISION AND OBJECTIVES

The Kingdom's vision for ICT aims at transforming the country to an information society through the utilization of ICT for providing information services to all strata of society, in all parts of the country, and by building a solid ICT industry to become a major source of national income.

The government views information as a strategic resource, and thus sees ICT as a major facilitator and driver for growth and prosperity. In particular, over the next few years, the objectives for ICT will focus on the following:

Continuing the development of the regulatory environment to ensure fair and effective competition in a free ICT market;

- Working towards increased availability and consumer choice in the provision of voice, data, and high quality broadband services across the Kingdom;
- Bridging the digital divide in the country by utilizing different strategies from infrastructure outreach to education and awareness;
- Exerting all required efforts for attaining an information society, characterized by a knowledge based economy, ICT-enabled learning, electronic government services, and efficient electronic commerce (E-Commerce);
- Working towards building a solid ICT industry, that is locally vibrant and internationally competitive.

CONSENSUS DOCUMENT

ICT USAGE AND CONTENT

Saudi Arabia is under transformation towards becoming an information society, with the main engines for this transformation being ICT applications, services, and content.

The government believes that E-Government will have a major effect on the public sector, the private sector, the national economy, and society at large. This is currently being implemented through a dedicated E-Government Program (Yesser), a joint program among MCIT, Ministry of Finance, and CITC. Yesser is based on best practices and international experiences, and is being executed in a coordinated, transparent, and decentralized fashion. The requirements for a successful E-Commerce and E-Government are to be met through enhancing telecommunication backbones; establishing relevant laws and regulations; ensuring information security and privacy; building a Public Key Infrastructure (PKI)⁷; developing common standards; establishing the national technical infrastructure; building an e-payment gateway⁸; using smart cards and creating the national e-services portal; introducing change management program across the public sector; and improving on postal delivery and related services.

Without rich and proper information content, ICT has a limited use. To that end, and as detailed in the national ICT Plan, MCIT is working towards instituting policies for the placement of Arabic digital content on the Internet, translating electronic content into Arabic, and using Arabic domain names for Internet addresses, a practical way for addressing Arabic web sites. Local publishers are encouraged to provide digital summaries for all books and reports they may have published or printed.

BRIDGING THE DIGITAL DIVIDE

The digital divide is being addressed by enhancing digital Arabic content, and spreading ICT awareness by means of computer and Internet literacy education, and by boosting the usage of PCs in the country. The home computing initiative, launched in mid 2005, aims at enabling one million homes to own personal computers within a period of 5 years.

MCIT is also working on plans to freely distribute to the public training material on CDs, which cover basic PC and internet skills. The training material will be available also through the MCIT learning portal.

Small and Medium Businesses (SMBs) are a major vehicle for economic growth and job creation. The government is coordinating an initiative to provide a complete solution to automate SMBs, promote awareness and standardization, and facilitate ownership of basic ICT tools and solutions. The policy on universal access and universal service, soon to be enacted, will bring the benefits of ICT to all geographic areas and to all social strata.

Developing the nation's human resources is a basic element of national development, and a major contributor to bridging the digital divide. The privatization program¹² attaches particular importance to Saudization, and aims at developing appropriate regulations and incentives to encourage the private sector to hire Saudi citizens, and provide opportunities for training and professional development.

(Source: <http://css.escwa.org.lb/ICTpolicymaking/5.pdf>)

Samples of Technology Literacy Policy

Kentucky Technology Standards

Academic Expectation 1.16

Students use computers and other kinds of technology to collect, organize, and communicate information and ideas.

Learning Links

Fiberoptics / Modems / Distance Learning / Microwave Transmission / Satellites / FAX Machines / Remote Sensing / CAD/CAM / Robotics / Bulletin Boards / E-Mail Demonstrators should be read from bottom to top, but need not be demonstrated sequentially.

Elementary Demonstrators

- Use a variety of technologies in various ways.
- Use technology to display information in various ways.
- Gather and manipulate data using technology.
- Express information and ideas using technology.

Middle School Demonstrators

- Express information and ideas creatively using technology.
- Analyze relationships/patterns to draw inferences using technology.
- Integrate the use of a variety of technologies.
- Expand knowledge by identifying and using technology for a specific purpose.
- Compare and analyze the effectiveness of various technologies for a specific purpose.

High School Demonstrators

- Conduct investigations; solve problems; create products; complete tasks by integrating various forms of technologies.
- Analyze and select appropriate technologies to efficiently complete a task and/or enhance productivity.

Sample Teaching/Assessment Strategies

Collaborative Process: Cooperative Learning, Peer Tutoring / Continuous Progress Assessment: Portfolio Development / Graphic Organizers: Time Line, Graphic Representations / Problem Solving: Creative Problem Solving, Inquiry, Future Problem Solving, Research, Case Studies, Simulations / Technology/Tools: Computers, Calculators, Telecommunications, Distance Learning, Interactive Video, Multimedia, Videotaping /Writing Process.

These sample strategies offer ideas and are not meant to limit teacher resourcefulness. More strategies are found in the resource section.

CONSENSUS DOCUMENT

Ideas for Incorporating Community Resources

- Interview a representative from KET on the ways technology influences programming.
- Invite a local doctor to discuss how technology influences diagnosis and treatment.
- Interview a representative from a newspaper on technological changes in the industry.

Core Concept - Using Electronic Technology

Sample Elementary Activities

- Create a database to record information about different trees. Recommend whether a given tree would flourish in Kentucky based on understanding of climate and weather in the state.
- Use a spreadsheet to record and graph the growth of plants given different soil and atmospheric conditions. Using a multimedia platform, present your findings as to the best methods to promote or hinder plant growth.
- Use CD-ROM reference materials to gather information to produce a report using multimedia (e.g., a word processor with graphing capabilities) comparing the metamorphosis of caterpillars to moths and tadpoles to frogs.
- Use audio or video tape to collect an oral history of your community. Write a report using multimedia to compare the variations in story versions.
- Use hypermedia to present the sequence of events in the growth of a flower from a seed.

Sample Middle School Activities

- Compare the damage created by earthquakes and volcanoes in the 20th century in the United States using a spreadsheet and graphing program. Use multimedia to report the results in a narrative document.
- Compare the personal characteristics of heroes from literature using a database. Present the results as posters created with graphic software.
- Demonstrate the movement of the planets in our solar system using hypermedia.
- Demonstrate how to proportionally increase ingredients in various recipes using a spreadsheet.
- Share autobiographies with students from another district using an electronic bulletin board via telecommunications.

Sample High School Activities

- Record and analyze, in a database, information related to capital punishment. Write a position paper, using research from CD-ROM and telecommunications resources, which either supports or refutes capital punishment as a means of crime prevention.
- Demonstrate the effects of changing variables in algebraic equations using a spreadsheet and graphs. Demonstrate, using hypermedia, the differences in energy use between monocotyledons and dicotyledons.

CONSENSUS DOCUMENT

- Discuss political issues with other students who are of a different political party or cultural background (e. g., Republican, Democrat, Independent, etc.) using telecommunications. Enter commentaries from discussions in a reflective journal.
- Present the economic, social, political, and entertainment issues related to the Kentucky Derby using multimedia. Reflect an opinion in the presentation as to the effects of these factors.
- Gather and analyze information regarding lotteries across the United States, using CD-ROM reference material and a spreadsheet with graphing capability. Prepare a position paper, using a word processor, about the value of lotteries with regard to the number of dollars spent by consumers, dollars won by consumers, dollars spent on advertising, and operational costs and the amount used for other purposes (a. g., funding state initiatives or special projects).

(Source: Kentucky Department of Education

<http://www.education.ky.gov/KDE/Instructional+Resources/Curriculum+Documents+and+Resources/Academic+Expectations/Academic+Expectation+116.htm>)

CONSENSUS DOCUMENT

New Hampshire K-12 ICT Curriculum Standards

Preface: The ideal ICT Literacy Program in grades K-8 weaves technology experiences into all content areas and all grade levels, so that a student can demonstrate ICT competency at the end of 8th grade. The ideal ICT Literacy Program in high school provides courses which allow students to focus on technology experiences that match their career aspirations. Digital portfolios at the K-8 and 9-12 levels are ideal demonstrations of competence, as they can show how students competently use technology tools and resources within the context of core content areas.

In order to meet the new ICT standards, schools which currently provide a middle school course in computer literacy should review their course requirements to ensure that assessment rubrics applied to digital portfolios are used. High school courses should be reviewed to ensure that topics listed in 306.42(c) are addressed and that a prerequisite for such courses is the completion of a digital portfolio as required in 306.42(a) (5).

Ed 306.42 Standards

All of the New Hampshire School Minimum Standards were updated and became effective 7/1/5. The ICT Literacy Program Standards, which are contained within the School Minimum Standards, are listed here:

Ed 306.42 Information and Communication Technologies Program.

(a) The local school board shall require an integrated approach to the use of 21st century tools, including, but not limited to digital technology and communication tools, within all curriculum areas through the adoption of an information and communication technologies literacy (ICT) program in grades K - 12 that provides opportunities at developmentally appropriate levels for students to:

(1) Develop knowledge of ethical, responsible use of technology tools in a society that relies heavily on knowledge of information in its decision-making;

(2) Become proficient in the use of 21st century tools to access, manage, integrate, evaluate, and create information within the context of the core subjects of:

- a. Reading;
- b. Mathematics;
- c. English and language arts;
- d. Science;
- e. Social studies, including civics, government, economics, history, and geography; f. Arts; and
- g. World languages;

(3) Use 21st century tools to develop cognitive proficiency in:

- a. Literacy;
- b. Numeracy;
- c. Problem solving;
- d. Decision making; and
- e. Spatial / visual literacy;

CONSENSUS DOCUMENT

(4) Use 21st century tools to develop technical proficiency at a foundational knowledge level in:

- a. Hardware;
- b. Software applications;
- c. Networks; and
- d. Elements of digital technology; and

(5) Create digital portfolios which:

a. Address the following components:

1. Basic operations and concepts;
2. Social, ethical, and human issues;
3. Technology productivity tools;
4. Technology communications tools;
5. Technology research tools; and
6. Technology problem solving and decision-making tools;

b. Represent proficient, ethical, responsible use of 21st century tools within the context of the core subjects; and

c. Include, at a minimum, such digital artifacts as:

1. Standardized tests;
2. Observation;
3. Student work; and
4. Comments describing a student's reflection on his/her work.

(b) The local school board shall provide opportunities for students to demonstrate ICT competency by the end of 8th grade using assessment rubrics applied to the contents of digital portfolios as required in (a)(5) above. Students who successfully demonstrate knowledge, skill, and understanding of these competencies shall have the opportunity, as high school students, to take a higher level computer course to meet the ½ credit requirement.

(c) The local school board shall provide opportunities for students to complete a ½ credit ICT course prior to high school graduation, including, but not limited to:

- (1) Use of common productivity and web based software;
- (2) Use of a variety of multimedia software and equipment;
- (3) Configuring computers and basic network configurations; and
- (4) Applying programming concepts used in software development.

(Source: New Hampshire Department of Educational Technology:

<http://www.nheon.org/oet/standards/ICTLiteracy.htm>)