Canadians for 21st Century Learning & Innovation

C21 Canada Presents:

Shifting Minds

C21 Canada Summit: February 15, 2012
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A. INTRODUCTION

The advent of the knowledge and digital age is fuelling profound and escalating changes in global economies and societies. Advancements in brain science are providing insights into how people learn while also demonstrating that the minds of today's youth, the so-called digital generation, are being hard-wired to the digital landscape within which they live. At the same time, studies are confirming a crisis of disengagement of learners from traditional learning and teaching models.

The OECD, European Union, UNESCO and numerous other think tanks and authors have concluded that these realities demand people acquire different competencies than those considered appropriate for success in the agrarian and industrial era. Highly literate, creative and innovative people are now seen as the drivers of the 21st Century and the prerequisites to economic success, social progress and personal empowerment. Many organizations and authors have identified these competencies and called for transformation of public education systems globally to meet current learning needs and educators to shift the way they teach to better engage learners.

Many countries are responding and have embarked on whole system reform of their education systems. The question that must be asked is: *What is Canada's response to meeting the learning realities of the knowledge and digital age?* What we do know is that many of the most globally successful countries are actively transforming their education systems to better prepare their young people to function in today's world of rapid technological change, economic globalization and increased migration and mobility.

The genesis of C21 Canada: Canadians for 21st Century Learning and Innovation is the shared belief of its members that public education in Canada must be transformed to position Canadians for success. The goal of C21 Canada is *to witness an accelerated pace of 21st competencies, instructional practices, and digital resources and services being integrated into Canada's learning systems*.

C21 Canada believes achievement of this goal is essential to meet the economic, social, environmental and financial aspirations of Canadians. Achieving the goal is within Canada's grasp, but will require ***Shifting Minds*** to the 21st Century learning reality at all levels in Canadian society. ***Shifting Minds*** means: 1) Understanding we need to shift what we teach and how we teach to engage, empower and position learners for success; and 2) shifting Canadians' attitudes to the imperative for 21st Century models of learning in public education.

Innovations in 21st Century models of learning deserve praise and challenge governments and education leaders who are looking for direction to institute change. A C21 Canada national framework is needed to cast a learning vision for governments, jurisdictions, school boards and education leaders, while engaging local and public support in achieving shared learning goals.

We require a significant shift in pedagogy, ensuring the focus is on learning as opposed to teaching. We need to train and support teachers to create relevant and rigorous learning experiences to ensure learners attain 21st learning competencies.

Members of C21 Canada understand that while the rapid expansion of digital capacity has fuelled profound change, it is not just about technology; it is how one is able to use technology to attain the competencies required for economic, social, environmental, financial success and personal growth and progress. The end game is not more classroom technology; it is about fostering creative and innovative minds.

Nonetheless, ICT rich learning environments are prerequisites to 21st Century models of learning. For example, we must be able to personalize the learning experience and ICT is the tool that makes this possible. In fact, on-line learning, blended learning and virtual schools offer viable learning options for many learners, and at the same time helps close the gap between learning opportunities available to students in urban areas versus rural and remote areas of Canada.

The shift to 21st Century models of learning is occurring in pockets across Canada. Innovative educators are delivering creative and innovative learning experiences for their learners. C21 Canada applauds these learning innovators but believes changes must be systemic and accelerated.

C21 Canada recognizes that the shared vision for public education needs to reflect a pan-Canadian focus while respecting local identities and practices. This vision must be founded on leading edge international learning research and be dynamic in nature given the unprecedented pace of change being witnessed globally. In this context, C21 Canada is seeking to create a 21st Century learning framework that reflects the transformative changes required, while allowing for flexibility in the actual design of implementation models.

This discussion paper has been created to facilitate C21 Canada's efforts to create a 21st Century learning framework that will positively engage Canadians, reflect Canadian values, and provide leadership in achieving C21 Canada's stated goal.

C21 Canada's objective for the *21st Century Learning Summit* is to harness the collective wisdom of the invited participants in creating a national vision and framework for 21st Century models of learning in Canada.C21 Canada and its members wish to take this opportunity to express their profound gratitude and appreciation to all the delegates who have convened for the sake of improving education in Canada. You are all to be commended for your commitment and your vision.

A. KEY REFERENCE DOCUMENTS

In preparing the proposed C21 Canada learning framework contained in *Section B*, multiple sources were reviewed. An Annotated Bibliography of these key references is contained in *Section E*.

A representative selection of framework concepts are summarized below for review by delegates to the February 15th Summit. Further review of references in the Annotated Bibliography is encouraged to appreciate the broader range of available information.

The Organization for Economic Cooperation and Development cites the progress of 17 of its 34 members, including Canada and the United States, in teaching 21st Century skills and competencies. The Partnership for 21st Century Skills represents the work of a coalition of organizations in the United States and its 16 participating states. A number of 21st Century learning initiatives already underway in Canada are also cited.

The comparison below is organized to distinguish learning competencies from content literacy, noting that learning skills are required by students to construct meaning, understanding and depth to achieve content literacy and adapt to the complexity of the workplace and life in general. The use of themes, inquiry and interdisciplinary practices offers relevancy to distinguish and personalize learner contexts, environments, places and spaces and creates the opportunity to engage in authentic, meaningful work at school.

Constructivist pedagogy, including explicit teaching of skills, building on prior knowledge, reflection and metacognition are essential in deepening understandings. Scaffolding, gradual release of responsibility and differentiated instruction and assessment are essential practices in ensuring mastery of skill development. A wide body of learning science supports these pedagogies, much of which is reflected in current curricula and frameworks.

Our students have experienced new forms of socialization and social capital from a generation of internet and emerging information and communication technologies. Digital technologies are recognized as having the potential to enhance the development of content literacy as well as further the development of learning skill competencies by virtue of the interaction and engagement they command.

The pursuit of integrating ICT in learning must however be cognizant of and address the legitimate public concerns associated with internet safety and cyber bullying. In addition, teachers must receive the training and support they require. The full potential of ICT in learning will only be realized when pre-service and in-service teacher standards and professional development activities are aligned to support teachers attaining the skills they need to best serve their students.

Jurisdictions across Canada share a priority for the education of its citizens as the capital required for economic success. Tools and resources are in place to close the gap between what young people are experiencing outside school and the finite learning options offered by schools. A Canadian 21st Century learning framework must set the stage for the shift towards the intelligent use of digital technology within the school system and across space and time.

Chart 1 provides a comparison among frameworks articulated by jurisdictions in Canada, the United States and the Organization for Economic Cooperation and Development.

CHART 1:

COMPARISON OF SELECTED 21ST CENTURY LEARNING FRAMEWORKS

	OECD (2009)	P21 (2009)	BC (2010)	PEI (2010)	AB (2010)
SKILLS: *knowledge and information literacy, numeracy; core subjects*	Reading, Mathematical, Scientific literacy (PISA) *Information Dimension*: Use language, symbols and text interactively *Communication Dimension*: use knowledge and information interactively	Language Arts, World languages, Arts, Mathematics, Economics, Science, Geography, History, Government and Civics	Functional numeracy and literacy, communications and media literacy	Literacy skills: Numeracy, reading, writing, media, technological, cultural STEM: science, technical, engineering and mathematics with the addition of the arts	Literacy and numeracy; Subject and discipline areas provide a context for developing competencies and opportunities for interdisciplinary learning
COMPETENCIES: *functions and processes required to become literate and address increasingly complex life and work environments; learning skills*	Interacting in heterogeneous groups: relating well to others, cooperation, managing and resolving conflict. Acting Autonomously: self-identify, set goals, take responsibility, act within the big picture, assert rights, interests, limits and needs	creativity and innovation, critical thinking and problem solving, communication and collaboration, flexibility and adaptability, initiative and self-direction, social and cross-cultural skills, productivity and accountability, leadership and responsibility	Critical thinking and problem solving, creativity and innovation, collaboration and teamwork, personal organization, motivation, self-regulation and adaptability, ethics, civic responsibility, cross-cultural awareness	Learning and Innovation skills: Critical thinking, problem solving, analytical skills, synthesis, communications, creativity, risk taking. Life Skills: flexibility, adaptability, resilience, social, accountability, responsibility, interpersonal skills, citizenship	critical thinking, problem solving and decision making, creativity and innovation, social, cultural, global and environmental responsibility, communication, collaboration and leadership, lifelong learning, personal management and well-being

ICT INTEGRATION: *required to develop skills and competencies*	virtual groups support interaction, collaboration and feedback both in and out of school, videogames strengthen communication and collaboration, gaming supports strategic thinking, reflection and metacognition among peers	Access, evaluate and use information, analyze media and create media products, Apply ICT effectively and ethically	Technological literacy - thinking tools to amplify learning and improve productivity and work effectively in the knowledge economy. Research and information fluency, Digital citizenship, technology operations and concepts	Technology is a major factor in improving school life; it is an enabler rather than an end in itself	Digital and technological fluency: access, understand and manipulate information creatively and effectively for learning, sharing and creation, critically, safely and ethically
THEMES: *interdisciplinary, social and global impacts; 21st century content*	Ethics and social impact dimension: globalization and multiculturalism provide ethical challenges to develop skills and competencies; Impact of ICT on social life and impact of actions on the environment	Global Awareness, Financial, Economic, Business and Entrepreneurial Literacy, Civic, Health and Environmental Literacy	Shifting roles: Passive student to active learner	Student-centred respecting gender, language, culture, ability. Project-based Learning to engage students in learning essential knowledge and life-enhancing skills through extended inquiry on authentic questions and carefully designed products and tasks.	Engaged thinking, ethical citizen with an entrepreneurial spirit
DRIVERS: *Innovative pedagogy; teach in a 21st century context using 21st century tools, personalize learning, engage differentiated instruction and scaffolding, balance formative and summative assessment.*	Learning science Pedagogy: constructivism, engaging in experiential learning and building on prior knowledge, differentiating instruction, reflection/meta cognition and scaffolding; access to diverse knowledge sources and explicit teaching of scaffolded skills by the teacher (2)	Emphasize deep understanding and learning skills, engage students in real world data, tools and experts, allow for multiple measures of mastery, use 21st century assessments that measure 21st century skills, portfolios, enable supportive technology, community resources, inquiry and higher order thinking	***From***... learning information to learning to learn, content-based system to skills-based system, one size fits all to tailored learning, testing to assess to assessing to learn, classroom learning to lifelong learning, teacher as lecturer to guide. Flexible path with project-based or integrated learning	Enhance student-centred culture; Teacher engagement and heightened civility. Enhance teacher excellence and toolkits through leadership, engagement, experiential, hands-on project-centred options. New models of assessing learner success. Role change for teachers from sources of knowledge to facilitators of learning. Empower creativity.	The student is at the centre of all decisions and discussions related to curriculum. Inclusive and safe schools, relevant and engaging, setting students up for success (FNMI)

REFERENCES:

1. Ananiadou, K and Claro, M. (2009) "21st Century Skills and Competencies for New Millennium Learners in OECD Countries", *OECD Educational Working Papers*, No. 41, OECD Publishing, http://dx.doi.org/10.1787/218525261154

2. Centre for Educational Research and Innovation (May 2008) "21st Century Learning: Research Innovation and Policy Directions from recent OECD analyses", OECD Publishing http://www.oecd.org/dataoecd/39/8/40554299.pdf

3. United States Department of Education and Partnership for 21st Century Skills, *Learning for the 21st Century A Report and Mile Guide for 21st Century Skills*, (2009) http://www.p21.org/overview/skills-framework

4. Premier's Technology Council (PTC) A Vision for 21st Century Education, December 2010 http://www.gov.bc.ca/premier/technology_council/

5. Proceedings of the Minister's Summit on Learning, June 4 and 5, 2010, Department of Education, http://www.gov.pe.ca/eecd/index.php3?number=1035077&lang=E

6. Framework for Student Learning Competencies for Engaged Thinkers and Ethical Citizens with an Entrepreneurial Spirit, Government of Alberta, http://education.alberta.ca/department/ipr/curriculum/framework.aspx

C. PROPOSED 21ST CENTURY LEARNING FRAMEWORK FOR CANADA

This section of *Shifting Minds* outlines a proposed Canadian 21st Century learning framework, for consideration by C21 Canada and delegates to the February 15th Summit and is divided into three (3) parts:

1. Guiding Principles
2. 21st Century Competencies
3. System Design Elements

Guiding Principles

The proposed 21st Century Learning Framework is founded on the following six (6) *Guiding Principles*:

Principle 1
All learners have the right to reach their full learning potential.

Principle 2
The primary focus of public education is to be relevant and meet the 21st Century learning needs of students.

Principle 3
21st Century learning competencies and pedagogies for instruction and assessment must be the foundation of learning systems.

Principle 4
Core elements of public education must be transformed to meet the needs of learners.

Principle 5
Personalized access to 21st Century learning environments and skilled teachers is a universal right of Canadian learners.

Principle 6
The escalating pace of change demands a learning framework that is dynamic in nature, and allows for improved engagement of stakeholders and the inclusion of alternate places and spaces for learning.

21st Century Learning Competencies

The following chart identifies the 21st Century competencies proposed to be the focus of the Canadian 21st Century Learning Framework and are believed to reflect the current body of knowledge on what learners must master to succeed.

CHART 2:

21ST CENTURY COMPETENCIES		
21ST CENTURY COMPENTENCY	TARGETED OUTCOMES	RATIONALE
Creativity, Innovation and Entrepreneurship	Creativity: The ability to apply creative thought processes to create something of value. *Innovation and Entrepreneurship*: The capacity to create and apply new knowledge in innovative and entrepreneurial ways to create new products or solve complex problems. *The capacity to invent new problem solving heuristics when all standard protocols have failed (Dede)*	Today's economic, social, environmental and financial challenges are increasingly complex and require creative, innovative and entrepreneurial thinking to solve problems and keep apace of the ongoing and escalating demand for new and innovative solutions and products. For success in school, work and life, people must be able to use creativity in order to adapt, generate new ideas, theories, products and knowledge.
Critical Thinking	A deep understanding of and capacity to apply the elements and processes associated with critical thinking and problem solving. The ability to acquire, process, interpret, rationalize and critically analyze large volumes of often conflicting information to the point of making an informed decision and taking action in a timely fashion.	The knowledge and digital era is demanding people with higher order thinking skills; the ability to think logically and to solve ill-defined problems by identifying and describing the problem, critically analyzing the information available or creating the knowledge required, framing and testing various hypotheses, formulating creative solutions, and taking action.

Collaboration	The ability to interact positively and respectfully with others in creating new ideas and developing products. The ability to lead or work in a team and to relate to other people in varying contexts, including capacity to resolve and manage conflict. The capacity for sensitivity to the issues and processes associated with collaborating across cultures. The ability to collaborate across networks, using various information and communication technologies.	Importance of interpersonal capabilities is higher and the skills involved more sophisticated than in the industrial era. Social media has created a dominant impact on the collaboration dynamic which occurs outside schools.
Communication	High level literacy skills, including strength in a person's mother tongue with multi-lingual capacity a definite asset. The ability to use technology to develop 21st Century competencies in the context of core subjects. The capacity to communicate using a variety of media and technologies. The ability to access, analyze, integrate and manage large volumes of information. The capacity to effectively use social media to communicate and resolve challenges. The ability to critically interpret and evaluate ideas presented through a variety of media and technologies. Highly developed cooperative interpersonal capabilities.	Importance of interpersonal capabilities is higher and the skills involved more sophisticated than in the industrial era.
Character	Learners will develop 21st Century *Life Skills*, such as: - Life-long and learner - Leadership, responsibility and accountability - Self-directed, adaptable and resilient - Tolerant, ethical and fair - Personal productivity - Interpersonal (people) skills - Mental and physical well being - Proficiency in managing personal relationships.	The knowledge economy and social environment is highly complex, fast paced, multi-cultural and stressful in nature, demanding people with highly developed interpersonal traits and strength of character. Collaborating to learn requires social emotional learning skills including self-awareness, social awareness, self-regulation, relationship skills

Culture and Ethical Citizenship	The capacity to comprehend Canada's political, social, economic and financial systems in a global context. The ability to appreciate cultural and societal diversity at the local, national and global levels. The ability to critically analyze the past and present and apply those understandings in planning for the future. The capacity to understand key ideas and concepts related to democracy, social justice and human rights. Disposition and skills necessary for effective civic engagement. The ability to understand the dynamic interactions of Earth's systems, the dependence of our social and economic systems on these natural systems, our fundamental connection to all living things, and the impact of humans upon the environment. The capacity to consider the impact of societal and environmental trends and issues.	Canadians place value on the history and culture which shapes our country and its people. Aboriginal communities in particular wish to see their culture reflected in Canadian education policy, programs and services. The increasingly global nature of the economic social, environmental and financial sectors means cross-cultural interactions, creating both opportunities and challenges that require unique competencies and skill sets. Canadians must be global citizens, with a clear identity of their own history and culture along with sensitivity and respect for diverse identities and cultures as impacted upon our sustainability.
Computer and Digital Technologies	The capacity to use computers and digital resources to access information and create knowledge, solutions, products and services. The capacity to use social media for learning.	The 21st Century is a technology and media driven environment and digital literacy is an essential competency for both learners and teachers.

While the capacity to effectively use computer and digital technologies is identified in Chart 2 above as a 21st Century competency, ICT must also be seen as inherent in all other competencies. Specifically, this means that ICT is a key enabler in achieving all the other competencies.

System Design Elements

This section identifies the core elements of public education that must undergo elements of transformation. This systemic change must be strategic and focused to be successful. Five areas of public education are identified for action and are summarized in the chart below.

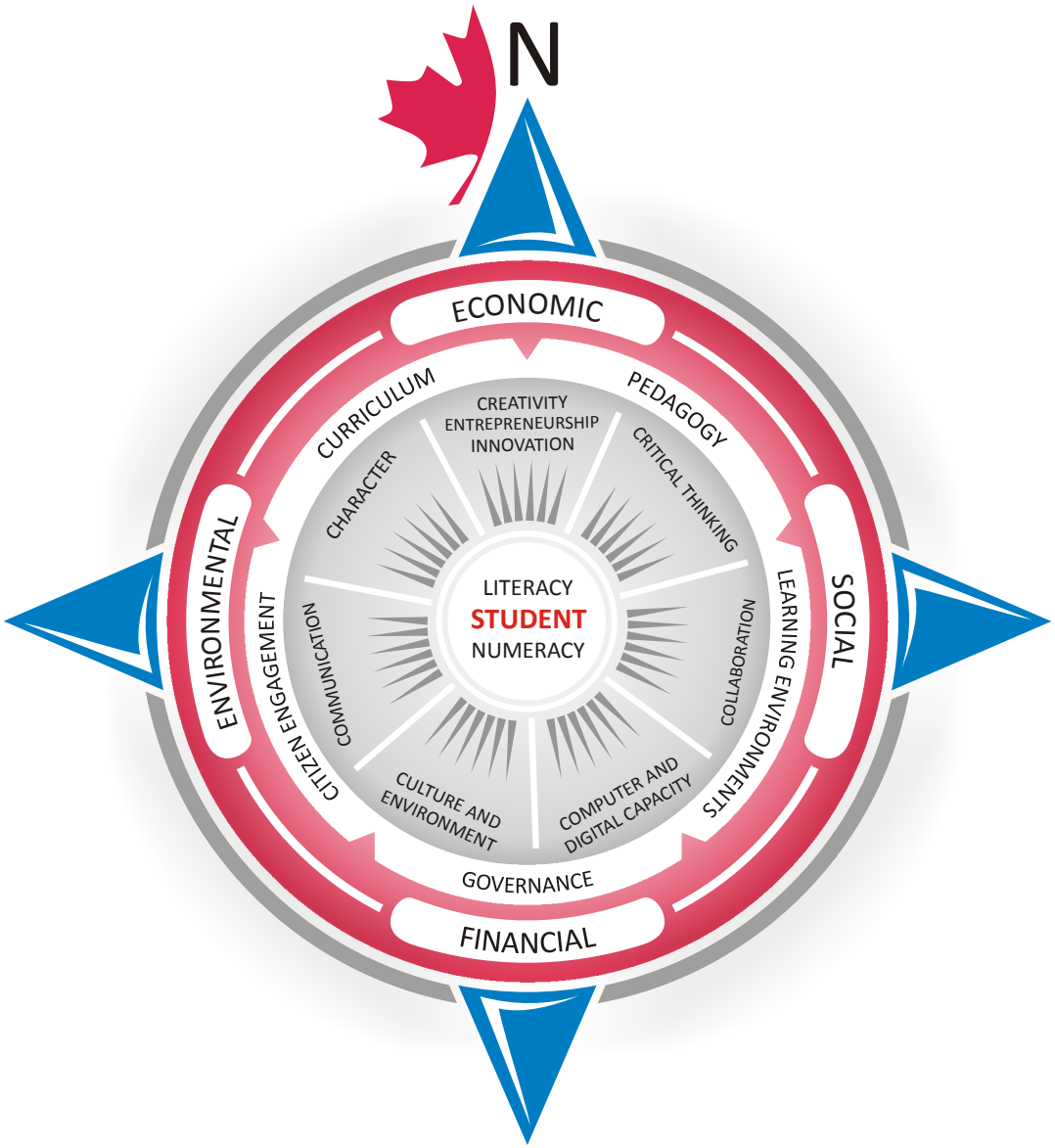
CHART 3:

SYSTEM REDESIGN PRIORITIES	
SYSTEM ELEMENT	PRIORITIES FOR ACTION
Curriculum	Learning outcomes and associated activities must be relevant to engage the 21st Century digital learner. The number of learning outcomes must be reduced substantially to increase instructional time and allow for depth of understanding. Learning outcomes must be rationalized across subject areas to reduce redundancy while strengthening cross-curricular relationships. Higher levels of learner performance in literacy, numeracy and science performance must be achieved. 21st Century competencies (7Cs of 21C) must be infused through-out all learning outcomes. Assessment regime(s) must be complementary to 21st Century learning outcomes and pedagogical practices. Digital technology must be harnessed to ensure data generation is dynamic and timely, and able to be mined effectively and efficiently to allow timely adjustments and interventions. Roles within education systems must be rationalized and clarified to enhance efficiency of program delivery.
Pedagogy	Teaching practices and assessment methods must change to align with 21st Century models of learning. Teachers must achieve fluency in using new technologies to engage and support student learning. Personalized learning opportunities must be offered to all students. Learners must have individualized access to the internet and digital resources. Teachers must offer project based learning opportunities to students reflecting the students passion and interest areas. Teachers must embrace collaborative teaching models (e.g. professional learning communities). The application of social media to learning must be achieved. Complementary standards and assessments must be realized. Flexibility in instructional time allocations must be attained to support anytime anywhere learning.

Learning Environment	Learning spaces must be flexible and offer opportunities for both personalized and collaborative learning. Learning environments must be ICT rich with adequate technical support and infrastructure. Design standards must support *Anytime Anywhere* learning opportunities. On-line learning, blended learning and virtual schools must be pursued as viable and relevant options to meeting the needs of many learners. Networks must be designed to facilitate a seamless transition between digital devices to access the internet. Assistive technologies to support the full range of learners, including gifted learners and learners with learning or physical disabilities, must be ubiquitous.
Governance	Creating a 21st Century model of learning requires a strategic and focused approach by governments and educators, and an alignment of purpose within the system. Leadership must be a shared responsibility of all education partners and stakeholders, demanding highly collaborative and communicative design and implementation processes. Creativity and innovation in the classroom is best promoted when central education agencies are responsible for policy (learning outcomes and resources) and schools are empowered and resourced to be creative and innovative in the delivery of learning (student performance and engagement).
Citizen Engagement	Parental and community engagement in the transformation process is a pre-requisite to success. Community engagement is essential to offer students both in-school learning supports and authentic learning opportunities outside the classroom. Societal awareness of and support for the return on investment benefits (economic, social, environmental, financial and personal) of 21st Century models of learning are essential for successful transformation.

DIAGRAM 1: True North - A 21st Century Vision for Learning in Canada

The graphic below illustrates the various elements of the proposed 21st Century learning framework and how they inter-relate. It is important to note that the student is placed at the centre. This placement emphasizes the focus of 21st Century models of education on meeting the learning needs of each individual student.



D. AVOIDING IRRELEVANCE: WHERE TO FROM HERE

We are ***not*** teaching our learners the competencies they will need to succeed. Our learners are being ill-prepared to compete for jobs with people from all over the world. Our future national productivity and competitiveness will suffer. Many nations are already reforming their education systems to position their societies for success within an increasingly competitive global environment. Failing to act today makes Canadians vulnerable to those countries that do.

Global research is clear:

✓ The competencies and skills required for success in the industrial era are not the same as those in the knowledge and digital age;

✓ Highly literate, creative and innovative people are the drivers of the 21st Century.

✓ Mastery of literacy, numeracy and science and 21st Century competencies is a prerequisite for success today and in the future.

C21 Canada's 21st Century Learning Framework (above) offers a vision and a direction for transforming Canada's learning systems to 21st Century models of learning.

The need for change is urgent. C21 Canada calls for immediate action in the following four critical areas:

1. Innovative Teaching Practices
Teachers begin harnessing the power of social media for learning and offer their learners interconnected learning experiences, choices, and opportunities.

Faculties of Education in Canada adopt 21st Century learning based pre-service teaching standards and integrate ICT into their own pedagogies and classrooms.

Provinces adopt 21st Century teaching standards for in-service teachers and provide the tools, resources and training required for teachers to be innovative, teach 21st Century competencies and engage their learners.

2. Student Centered Pedagogy
Learners offered self-paced, self-directed, individualized and technology supported learning opportunities.

Frameworks, benchmarks, portfolios and other asset-based approaches to assessment be implemented.

3. Extension of Learning Beyond the Classroom

Learners offered on-line, blended and virtual school learning opportunities with access to teachers worldwide.

Communities offer students authentic learning opportunities outside of the school.

4. ICT Integration

Learning systems offer ubiquitous access to WiFi.

Learners offered 1:1 computing, particularly in the middle to upper grades.

Learning systems explore cloud-based services and opportunities

The most important next step is for parents and all levels of government in Canada to recognize the imperative of 21st Century models of learning for positioning learners and Canada for success in the knowledge and digital age.

E. ANNOTATED BIBLIOGRAPHY OF 21ST CENTURY FRAMEWORKS

Following is an annotated bibliography designed to provide delegates to the 21st Century Learning Framework Summit with access to some of the best national and international documentation and references on 21st Century learning frameworks. The annotated bibliography is divided into two sections: non-government and government resources.

NON GOVERNMENT REFERENCES

GENERAL INTEREST

Comparing Frameworks for "21st Century Skills"
Article comparing various frameworks for "21st Century Skills," (P21, EnGauge, OECD, AAC&U), as well as frameworks for "Digital Literacies." (The "Digital Literacies" frameworks were not researched in depth as the current document deals with a broader skill set. Also note that titles for the P21 skills might not be exactly correct.)
Dede, C. (2010). **Comparing Frameworks for 21st Century Skills**. In Bellanca, J., & Brandt, R. (Eds.), *21st century skills: Rethinking how students learn* (pp 51-74). Bloomington, IN: Solution Tree.
Available online at:
http://www.watertown.k12.ma.us/dept/ed_tech/research/pdf/ChrisDede.pdf

Toward a New Learning Ecology Teaching and Learning in 1:1 Environments: *As the nation's economy continues its irrevocable shift from manufacturing toward idea-driven, creative industries, our schools—and the teaching and learning enterprise at the heart of our schools—need to undergo a transformation as well. The result of such a transformation needs to be a type of educational experience and expertise that will not only support but also ignite participation in—and leadership for—an idea-driven, creative economy. Equally important as supporting a new economy is educational experience and expertise that supports a global citizenry.*

Toward a New Learning Ecology Teaching and Learning in 1:1 Environments | Published: April 22, 2009 11:51 AM Authors: Hiller Spires, Eric Wiebe, Carl A. Young, Karen Hollebrands, & John Lee
http://www.fi.ncsu.edu/assets/podcast_episodes/white-paper-series/toward-a-new-learning-ecology.pdf

21st century skills and serious games: Preparing the N generation
Ensuring that all students have the opportunity to participate fully in society is a daunting challenge for educators. Central to this challenge in the 21st century is changing how we view learning. Serious games, an area that is gaining momentum in education, has potential to transform how we view learning as we meet the fast- paced, ever-changing demands of modern life and work. Forging a conceptual bridge between serious games and 21st century workplace skills, this chapter: 1) defines evolving characteristics of the 21st century learner, 2) synthesizes proposed 21st century skills from different disciplines, and 3) analyzes how certain features of serious games can promote the highly valued 21st century skills of expert problem-solving and complex communication. The chapter closes with a call for more thoughtful empirical studies in order to establish a research base that ultimately will affect policies around the use of serious games in school settings.

Spires, H.A. (2008). 21st century skills and serious games: Preparing the N generation. In L.A. Annetta (Ed.), Serious educational games (pps. 13-23). Rotterdam, The Netherlands: Sense Publishing. http://www.fi.ncsu.edu/assets/research_papers/crystal-island-5/21st-century-skills-and-serious-games-preparing-the-n-generation.pdf

Equipping Every Learner for the 21st Century

A Cisco Whitepaper that proposes a new paradigm of 21st century learning; one that will require a holistic transformation of education systems. A corporate site but consistent with what other framework documents are saying with respect to public education and the need to change to answer the needs of the 21st Century. This paper is very similar to P21 in philosophy and content - Excellent backgrounder on the "why" of 21st Century learning. Also speaks to pedagogical changes and the role of leadership in effecting the requisite changes.

Cisco Systems Inc. (2008). **Equipping Every Learner for the 21st Century**. Retrieved from The Network: Cisco's Technology News Site website: from http://newsroom.cisco.com/dlls/2008/ekits/Equipping_Every_Learner_for_21st_Century_White_Paper.pdf?POSITION=LINK&COUNTRY_SITE=us&CAMPAIGN=Century21Learning2008&CREATIVE=Equipping+Every+Global+Learner+for+the+21st+Century&REFERRING_SITE=NewsatCiscoPressKit

Horizon Reports

Horizon Report > 2011 K-12 Edition

Emerging technologies and key trends and challenges that will impact teaching, learning, and creative inquiry in the K-12 sector over the next five years. Reports have been generated for the past three years. The Link below is to the most recent 2011 report.

Johnson, L., Adams, S., and Haywood, K., (2011). The NMC Horizon Report: 2011 K-12 Edition. Austin, Texas: The New Media Consortium.
http://www.nmc.org/pdf/2011-Horizon-Report-K12.pdf
New Media Consortium Website: http://www.nmc.org/publications

Innovative Teaching and Learning Research

This report provides findings from a study of teaching and learning ecosystems from 7 countries. The focus of the study was to gather teaching practices which showed strong relationships with 21st century learning outcomes. Student-centred pedagogies, extending learning beyond the classroom to include knowledge-building and problem solving in the world, and ICT integration into pedagogy to broaden and deepen learning goals were the three categories of practices which emerged from the study.

Langworthy, Maria (2011), Innovative Teaching and Learning 2011 Research Findings and Implications
http://www.itlresearch.com/index.php?option=com_content&view=category&layout=blog&id=17&Itemid=15

21st Century Skills: Learning for Life in Our Times

This book introduces a framework for 21st Century learning and identifies the skills required. Includes emphasis on core subjects such as reading, writing and arithmetic while arguing for more focus on contemporary themes such as global awareness and economic, financial, health and environmental literacies. (Bernie Trilling and Charles Fadel, 2009) Jossey-Bass Publications.

http://www.amazon.ca/21st-Century-Skills-Learning-Times/dp/0470475382

Kaiser Family Foundation Reports

Generation M2: Media in the Lives of 8- to 18-Year-Olds (2010)

A national survey by the Kaiser Family Foundation found that with technology allowing nearly 24-hour media access as children and teens go about their daily lives, the amount of time young people spend with entertainment media has risen dramatically, especially among minority youth. Today, 8-18 year-olds devote an average of 7 hours and 38 minutes (7:38) to using entertainment media across a typical day (more than 53 hours a week). And because they spend so much of that time 'media multitasking' (using more than one medium at a time), they actually manage to pack a total of 10 hours and 45 minutes (10:45) worth of media content into those 7½ hours.

This is the third in a series of large-scale, nationally representative surveys by the Foundation about young people's media use. It includes data from all three waves of the study (1999, 2004, and 2009), and is among the largest and most comprehensive publicly available sources of information about media use among American youth.

Victoria J. Rideout, Ulla G. Foehr and Donald F. Roberts (2010). **Generation M2: Media in the Lives of 8- to 18-Year-Olds.** The Henry J Kaiser Family Foundation, Washington. Publication (#8010). http://www.kff.org/entmedia/upload/8010.pdf

Pew Internet American Life Project Reports

The PEW Internet and American Life Project prepares reports on the impact of the internet on all aspects of American life. Technology, Social media and Internet use stats are available in several categories for all age groups.

PEW Internet and American Life Project website: http://www.pewinternet.org

Walden University Study

This study, based on a survey of more than 1,000 U.S. K-12 teachers, addresses five myths about technology use in education—particularly by teachers—and educators' perceptions about the effects of technology use on student learning, behaviours and skills. It is suggested that teachers have a vital role to play at the intersection of technology and 21st century expertise—modeling their confidence with technology, guiding young minds toward constructive educational purposes, and teaching students the tried and new skills for college and career readiness in a competitive world. This study also comments on the impacts of teacher technology use on several aspects of student performance and behaviour. 21st Century skills acquisition is also impacted.

Grunwald and Associates. (2010). Educators, technology and 21st century skills: Dispelling five myths. Retrieved from Walden University, Richard W. Riley College of Education website: from www.WaldenU.edu/fivemyths

CANADA

21st Century Fluency Project (Infosavvy Group, British Columbia)

Collaborative effort for sharing ideas and "developing resources for transforming learning to be relevant to life in the 21st Century". They have produced many papers on the need for changes in education. They have also produced "Curriculum Integration Kits" and are working on a series of 6 publications as part of the 21st Century Fluency Project. (2 examples below).

Website: http://www.fluency21.com

Living on the Future Edge: Windows on Tomorrow
The first in a series of six books to be authored by the 21st Century Fluency Project. Focuses on the state of education and the need for change in the face of society and its relationship with technological innovation. The book calls for teachers to abandon their paradigms in favour of digital age strategies for engaging students and bringing relevance to education. They emphasize that change is not going to happen but is, has been and will continue to. Emerging tech trends that impact education are explored and ideas for innovative practice are suggested.
Jukes, Ian; McCain, Ted & Crockett, Lee. (2010). **Living on the Future Edge: Windows on Tomorrow.** Kelowna, BC, Canada: 21st Century Fluency Project Inc.
Pp. 152 ISBN 978-1-4499-7552-6 http://www.amazon.ca/Living-Future-Edge-Windows-Tomorrow/dp/1412982359

Understanding the Digital Generation: Teaching and Learning in the New Digital Landscape
This book gives specific reasons why teachers should incorporate technology into pedagogy to meet the needs of "Digital Immigrants". Provides various accounts of how students learn, think and how their brains are wired differently. All are encouraged to up their game to incorporate the tools or the digital generation to adequately prepare students for the 21st century workplace. You can't identify what is needed for the 21st century by being rooted in 20th century thinking and practice. Examples are given.
.Jukes, Ian; McCain, Ted & Crockett, Lee. (2009) **Understanding the Digital Generation: Teaching and Learning in the New Digital Landscape**. SAGE Publications: 21st Century Fluency Series.
Pp. 150 ISBN 978-1-4129-3844-0. http://www.amazon.ca/Understanding-Digital-Generation-Teaching-Landscape/dp/1412938449

UNITED STATES

EnGuage (Metiri Group and NCREL)
enGauge®21st Century Skills: Literacy In The Digital Age
This paper emphasizes the need for students to thrive in the digital age. Examples of specific digital age literacies and examples of the types of inventive thinking skills are highlighted. Likewise specific 21st Century and "high productivity" Skills are identified. The importance of academics is acknowledged, but against a backdrop of digital readiness and holding schools accountable for preparing students adequately. An attempt at explaining the "how" of 21st Century education is included (page 73) as is a cross comparison to earlier models such as NETS and Standards for Technological Literacy (2000).
Metiri Group and NCREL. (2003). **enGauge®21st Century Skills: Literacy In The Digital Age.** Retrieved 2012, from Informing the Curriculum: Qualcomm Institute for Innovation and Educational Success: http>//picct.sdsu.edu/engauge21st.pdf

enGauge 21st Century Skills for 21st Century Learners
Two page brief summarizing the attributes of the enGauge Framework. More of a brochure, but a good tight synopsis.
Metiri Group. (2005). **enGauge 21st Century Skills for 21st Century Learners**. Retrieved 2012, from Metiri Learning: http://learning.metiri.com/mod/resource/view.php?id=362

21st Century Learning
The convergence of Globalization, Digital Innovations and Learning Sciences Breakthroughs has created a zone of optimized learning and a compelling sense of urgency for 21st Century learning infused with technology. Caution about the implementation of tech in learning and that it can't stand alone.

Technology is implicated in enhanced student engagement. Several studies are reviewed demonstrating the impact of tech on learning.
Lemke, C. (2006). 21st Century Learning. (Metiri Group) Retrieved 2012, from Metiri Learning: http://learning.metiri.com/mod/resource/view.php?id=364

P21 (Partnership for 21st Century Skills)
A national organization "advocating for 21st Century readiness for every student". P21 and its members provide tools and resources to help the U.S. education system keep up by fusing the 3Rs and 4Cs (Critical thinking and problem solving, Communication, Collaboration, and Creativity and innovation). While leading districts and schools are already doing this, P21 advocates for local, state and federal policies that support this approach for every school. This website is the home of the P21 Framework as well as a host of resources for members (includes "Route 21", an excellent library of research and information pertaining to 21st Century Skills). P21 has also published many papers central to their framework that are germane to 21st century models of learning (see below for some of the more relevant publications).
Website: www.p21.org

Framework for 21st Century Learning
A brief 2 pager outlining the Framework for 21st Century Learning as proposed by the Partnership for 21st Century Skills (P21). Mastery of core subjects is emphasized as is higher level understanding of content achieved by "weaving" 21st Century Interdisciplinary Themes and Skills into those subjects. Themes include: global awareness, financial literacy, civic literacy, health literacy and environmental literacy. 21st Century Skills include: creativity, innovation, critical thinking, communication and collaboration. Life and career skills such as: flexibility, self management, cross cultural skills, leadership and responsibility are also stressed.
Partnership for 21st Century Skills. (2009). **Framework for 21st Century Learning**. Retrieved 2012, from Partnership for 21st Century Skills:
http://www.p21.org/storage/documents/P21_Framework.pdf

A State Leaders' Action Guide to 21st Century Skills
A call to action for State Leaders -what matters to students today differs from the traditional view. A warning about the lack of preparedness a traditional education will provide in today's economy. A vision is presented for 21st Century learning in the US. Seven strategies are outlined for a successful 21st Century Skills Initiative and a lofty attempt at the "how of 21st Century Learning. More of a to-do list than a manual for how.
Partnership for 21st Century Skills. (2006). **A State Leaders' Action Guide to 21st Century Skills.** Retrieved 2012, from http://www.p21.org/storage/documents/stateleaders071906.pdf

21st Century Skills, Education & Competitiveness: A Resource and Policy Guide.
Focus on the needed response of education to the fundamental shift in economy. This paper formalizes the connection between education and global competitiveness. It is believed that the competitiveness of today's students in tomorrow's economy is dependent upon policy makers showing leadership in the creation of a 21st Century Education system. Includes sample state and local policy initiatives. Nice graphics demonstrating economic shifts and builds a good case for the need for change.
Partnership for 21st Century Skills. (2008). **21st Century Skills, Education & Competitiveness: A Resource and Policy Guide**. Retrieved 2012, from Partnership for 21st Century Skills:
http://www.p21.org/storage/documents/21st_century_skills_education_and_competitiveness_guide.pdf

Beyond the Three Rs. Voter Attitudes toward 21st Century Skills
*P21 document giving voter attitudes and opinions as to 21st Century Skills needed for public education. "A virtually unanimous **99 percent** of voters say that teaching students a wide range of 21st century skills—including critical thinking and problem-solving skills, computer and technology skills, and communication and self-direction skills—is important to our country's future economic success."*
Partnership for 21st Century Skills. (2007). **Beyond the Three Rs. Voter Attitudes toward 21st Century Skills**. Retrieved 2012, from Partnership for 21st Century Skills: http://p21.org/storage/documents/P21_pollreport_singlepg.pdf

Are They Really Ready To Work? Employers' Perspectives on the Basic Knowledge and Applied Skills of New Entrants to the 21st Century U.S. Workforce
This Conference Board (and P21 - Partnership for 21st Century Skills) Report gives scores for various competencies for new entrants into the workforce that have a grad degree, and strengths and weaknesses. A survey of over 400 employers highlighting the most sought after basic and applied skills. All high school workplace entrants scored as deficient on all measures. Two-year college entrants received and excellence rating for IT Application but deficiency on all other measures. Four-year university entrants had more excellence ratings than deficiencies. Areas of needed improvement are highlighted, as is the problem of retirement rate and workforce needs.
The Conference Board, Partnership for 21st Century Skills, Society for Human Resource Management, Corporate Voices for Eorking Families. (2006). **Are They Really Ready To Work? Employers' Perspectives on the Basic Knowledge and Applied Skills of New Entrants to the 21st Century U.S. Workforce.** Retrieved 2012, from Partnership for 21st Century Skills: http>//p21.org/storage/documents/FINAL_REPORT_PDF09-29-06.pdf

Project Red: The Technology Factor. Nine Keys to Student Achievement and Cost-Effectiveness
The first large-scale national study to identify and prioritize the factors that make some technology implementations perform dramatically better than others, demonstrate that schools employing a 1:1 student-computer ratio and the key implementation factors outperform other schools, and reveal significant opportunities for improving education return on investment (ROI) by transforming teaching and learning. Reinforces that technology alone is not transformational. Very comprehensive look at the factors that must be changed to meet the technological needs of 1 to 1 computing. Also considers the impact of these factors on stakeholders, leaders, policy makers etc.
The Greaves Group, The Hayes Connection, One to One Institute. (2010). **The Technology Factor. Nine Keys to Student Achievement and Cost-Effectiveness. Retrieved 2012, from Pearson Foundation**: http://www.pearsonfoundation.org/downloads/ProjectRED_TheTechnolgyFactor.pdf

Technology has changed the world…and it can change education too
There is a positive impact of technology use on student performance and school finance. Ubiquitous technology, when properly implemented, can drastically impact educational success as measured by drop-out rates, high stakes testing, discipline referrals and graduation rates. There are 5 key benefits of using tech in schools. Financial benefits are also mentioned.
Project Red. (2010). Technology has changed the world…and it can change education too. Retrieved 2012, from Project Red: http://www.projectred.org/uploads/PREP11/PR_Brochure_04292011.pdf

AAC&U (American Association of College and Universities)
Educating the Net Generation
An e-book collection of articles relating to 21st Century learning. Each chapter is an article focusing on an aspect of what learning needs to look like. One chapter in particular "Curricula Designed to Meet 21st Century Expectations is of particular interest. However all chapters/articles are worthy of

our attention as they work through the issues that confront education. This book is consistent with constructivist education and therefore authentic learning. Technology and personalization also garner favor.
Oblinger, D. G. (2005). Educating the Net Generation. Retrieved 2011, from Educause: http://net.educause.edu/ir/library/pdf/pub7101i.pdf

ISTE ICT Skills (International Society for Technology in Education)
ISTE | NETS Student Standards 2007
The skills and knowledge students need to learn effectively and live productively in a digital world. Categories include: Creativity and Innovation, Communication and Collaboration, Research and Information Fluency, Critical Thinking, Problem Solving, Decision Making, Digital Citizenship and Technology Operation and Concepts.
International Society for Technology in Education. (2007). **ISTE | NETS Student Standards 2007**. Retrieved 2012, from International Society for Technology in Education: http://www.iste.org/standards/nets-for-students/nets-student-standards-2007.aspx
(International Society for Technology in Education, 2009)

The ISTE NETS and Performance Indicators for Teachers (NETS-T)
A framework for educators to use as they transition schools from Industrial Age to Digital Age places of learning. Categories include: Facilitating and Inspiring Student learning and Creativity, Designing and Developing Digital-Age Learning Experiences and Assessments, Modeling Digital-Age Work and Learning, Promoting and Modeling Digital Citizenship and Responsibility and Engaging in Professional Growth and Leadership.
International Society for Technology in Education. (2008). **The ISTE NETS and Performance Indicators for Teachers (NETS-T)**. Retrieved 2012, from International Society for Technology in Education: http://www.iste.org/Libraries/PDFs/NETS_for_Teachers_2008_EN.sflb.ashx

The ISTE NETS and Performance Indicators for Administrators (NETS-T)
Defines what administrators need to know and be able to do in order to discharge their responsibility as leaders in the effective use of technology in our schools. Categories include: Visionary Leadership, Digital-Age Learning Culture, Excellence in Professional Practice, Systemic Improvement and Digital Citizenship.
International Society for Technology in Education. (2009). **The ISTE NETS and Performance Indicators for Administrators (NETS-T)**. Retrieved 2012, from International Society for Technology in Education:
http://www.iste.org/Libraries/PDFs/NETS_for_Administrators_2009_EN.sflb.ashx

Educational Testing Service ICT Literacy Standards
Digital Transformation. A Framework for ICT Literacy
This framework is an early effort to provide a foundation for the design of instruments including large-scale assessments intended to inform public policy and diagnostic measures to test an individual's skills associated with information and communication technology. The authors maintain the need for ICT and the importance that ICT literacy plays and will play in an increasingly technological workplace.
International ICT Literacy Panel. (2002). **Digital Transformation. A Framework for ICT Literacy**. Retrieved 2012, from Educational Testing Service:
http://www.ets.org/Media/Tests/Information_and_Communication_Technology_Literacy/ictreport.pdf

Jenkins Literacies based on New Media
Confronting the Challenges of Participatory Culture: Media Education for the 21st Century
This report answers to reports like the Pew Internet Project that monitors media use by students. Participation in culture will increasingly mean by digital means. We need to be sure that students are not learning how to engage this way on their own simply by interacting with popular culture. We need to be sure that students have the skills and experiences necessary to become full participants. That means understanding the role played by media in our lives and the ethics of being participants in an online environment. Simple access to technology doesn't guarantee full engagement. This paper is an accounting of the cultural competencies and social skills required by young people to truly be part of the participatory culture afforded by technology and the new media. The roles of schools parents and society are discussed. The new skills/literacies are outlined.
Henry Jenkins, R. P. (2008). **Confronting the Challenges of Participatory Culture: Media Education for the 21st Century**. Retrieved 2012, from New Media Literacies: http://newmedialiteracies.org/files/working/NMLWhitePaper.pdf

Dede's Neomillennial Learning Styles
Determining, Developing and Assessing the Capabilities of "Future-Ready" Students
White Paper produced to stimulate dialog in North Carolina about preparing their students for the future. A comparison of the various frameworks is presented. Concern is expressed that existing frameworks are short on specifics as to what actual skills and content should be taught. A good description of the economic reality of declining portions of the labour force and what this means for "future ready" students. Points out that the 21st century is quite different than the 20th in the capabilities people need for work, citizenship, and self-actualization. This White Paper discusses 1) how to determine future-ready capabilities by offering a synthesized framework for 21st century skills, 2) how to develop these capabilities through proposed curricular evolution, and 3) how these capabilities should be assessed in contemporary learning environments.
Dede, C. (2009). **Determining, Developing and Assessing the Capabilities of "Future-Ready" Students**. Retrieved 2012, from Friday Institute for Educational Innovation: http://www.fi.ncsu.edu/assets/research_papers/brown-bag/determining-developing-and-assessing-the-capabilities-of-future-ready-students.pdf

INTERNATIONAL

AALF (Anytime Anywhere Learning Foundation)
21 Steps to 21st Century Learning™ A Framework for Effectively Implementing 1-to-1
AALF's framework for implementing a 1 to 1 computing device learning environment. A rough guide intended to inform leadership teams through the process.
21 Steps to 21st Century Learning™ A Framework for Effectively Implementing 1-to-1
http://www.aalf.org/comm/docs/files/21.pdf (Introduction)
http://www.aalf.org/comm/docs/files/21.pdf (Main Body)
http://www.aalf.org/comm/docs/files/22.pdf (Graphic)

EUROPEAN UNION: Key Competences For Lifelong Learning
Framework for identifying key competencies for 21st Century Learning in Europe. Literacy and numeracy figure prominently as domains as do Digital literacy, Learning to Learn, Social and Civic Competences, Initiative and Entrepreneurship and Cultural Awareness and Expression
Directorate-General for Education and Culture (2007). **Key Competences For Lifelong Learning.** Retrieved 2012, from European Commission Education and Culture:
http://ec.europa.eu/dgs/education_culture/publ/pdf/ll-learning/keycomp_en.pdf

Implementation of "Education and Training 2010" Work Programme "Key Competencies"
Contains the Framework for Key Competences in a Knowledge-Based Society. Features the domains and associated competences as well as the associated knowledge, skills and attitudes outcomes. There are also some interesting background documents in the literature cited.
Directorate-General for Education and Culture (2004). **IMPLEMENTATION OF "EDUCATION AND TRAINING 2010" WORK PROGRAMME "Key Competencies"**. Retrieved 2012, from European Commission Education and Culture:
http://ec.europa.eu/education/policies/2010/doc/basicframe.pdf

OECD (Organization for Economic Cooperation and Development)
Definition and Selection of Key Competencies Executive Summary
The OECD Core competencies. *A brochure summarizing the OECD's Definition and Selection of Competencies (DeSeCo) Project. Suggests 3 categories for "key" competencies. Good backgrounder on what makes for a key competency and how to choose what they will be. This document provides a framework that can guide the longer-term extension of assessments into new competency domains (PISA is the model they use to frame this discussion).*
OECD Directorate for Education (2005). **Definition and Selection of Key Competencies Executive Summary**. Retrieved 2012, from OECD Education Directorate:
http://www.oecd.org/dataoecd/47/61/35070367.pdf

21st Century Skills and Competences for New Millennium Learners in OECD Countries
A short discussion of the importance and relevance of 21st century skills and competencies in the current policy debate and the definitions and conceptual frameworks that have been used in the literature, and proposes a new three-dimensional framework, consisting of the dimensions of information, communication and ethics and social impact. Based on a questionnaire of OECD countries as well as white papers and other literature. Most countries have referenced 21st Century skills as being a priority; few have followed through to the point where assessment practice policy has been established. Also teacher training programs have not generally included 21st Century skills or the role of ICT in pedagogy into their syllabi. This paper discusses the implications that this has on the development of 21st Century skills, assessment practice and teacher preparation.
Ananiadou, K. and M. Claro (2009), **"21st Century Skills and Competences for New Millennium Learners in OECD Countries"**, OECD Education Working Papers, No. 41, OECD Publishing.
http://dx.doi.org/10.1787/218525261154

Investing in Human and Social Capital: New Challenges. Theme 2: Matching skills to new needs
A call to match education with the actual skills that are needed by the economy, this paper emphasizes the need for systems to design educational program paths that are flexible and can respond to the needs of various sectors as their requirements change in response to world economic trends. "With a rapidly rising demand for skills, countries can no longer simply rely on education systems that efficiently sort individuals, but need to improve learning outcomes throughout the population and to capitalize on the full potential of all individuals." Employable skills and occupational mobility, mixes of vocational training and academic focus that meshes student interest with employer needs and assessment are also themes. "Schools need to get their learning goals and standards right and to transform their assessment systems to reflect what is important, rather than what can be easily measured."
OECD Education Ministerial Meeting, Paris, 4-5 November (2010). **Investing in Human and Social Capital: New Challenges. Theme 2: Matching skills to new needs.** Retrieved 2012, from OECD Education Directorate: http://www.oecd.org/dataoecd/59/13/46253090.pdf

Investing in Human and Social Capital: New Challenges. Theme 3: Equipping effective teachers for the 21st Century
This document initiates a discussion about teachers and their professional development; specifically what forms have the best impact and how systems can respond to the professional development needs of teachers in the face of 21st Century education. "But there is a large gap - perhaps even a gulf - between the evidence on effective learning environments for the 21st century and established practice in many of today's schools and classrooms."
OECD Education Ministerial Meeting, Paris, 4-5 November (2010). **Investing in Human and Social Capital: New Challenges. Theme 3: Equipping effective teachers for the 21st Century.** Retrieved 2012, from OECD Education Directorate: http://www.oecd.org/dataoecd/59/12/46253099.pdf

GOVERNMENT REFERENCES

CANADIAN

The Government of Canada in its Throne and Budget Speech on March 3, 2010 has committed to a multi-year Digital Economy Strategy to accelerate the adoption of digital technologies critical to our economy and society. Industry Canada in its Consultation Paper calls for the intelligent use of digital technologies and the shift towards next generation and broadband infrastructure networks to support innovation and remote and rural needs. The Government of Canada has renewed a suite of programs to develop language and culture using social networking and the creative process in film, music, and digital media and publishing.
Industry Canada, *Improving Canada's Digital Advantage Strategies for Sustainable Prosperity Consultation Paper on a Digital Economy Strategy for Canada*, http://de-en.gc.ca/consultation-paper/
Industry Canada identifies science, technology and innovation as critical to Canada's economic development and social well-being, providing benchmarked evidence of the country's performance internationally. The business plan and budget place priority on the need to attract

and retain world-class students and researchers and to provide the research tools and infrastructure to grow Canada's capacity for innovation. Industry Canada identifies among its strategic enablers – people management, stewardship, management of information and technology along with communications and engagement.
Industry Canada, *Industry Canada Business Plan 2011-12*, www.ic.gc.ca/businessplan

Budget 2011 continued support of Canada's Digital Economy Strategy is the latest in a series of legislative and program initiatives, reflecting the Government's commitment to the digital economy. It provides a framework to encourage the private sector to adopt new technologies for the workforce of tomorrow. The National Research Council's Digital Technology Adoption Pilot Program is set to assist Canada's overall productivity and create market growth and opportunity. Funding is also available to colleges to deliver services and expertise to small and medium sized businesses.
National Research Council, *Government of Canada invests in Canadian business innovation Making Canada a global leader in the digital economy,* November 14, 2011, http://www.nrc-cnrc.gc.ca/eng/news/nrc/2011/11/14/dtapp-nr.html

Human Resources and Skills Development Canada (HRSDC) in reaching its mandate to improve the literacy and essential skills of adult Canadians, the 2010 – *2011 Consultation Report on HRSDC's Suite of Literacy and Essential Skills Tools* determined nine 21st century reading, writing, document use and numeracy skills common in fulfilling workplace needs. The Office of *Literacy and Essential Skills* (OELS) in its Literacy and Essential Skills has created and disseminated a set of developmental tools to support stakeholder policies and staff training needs.

Human Resources and Skills Development Canada, *Consultation Report on HRSDC's Suite of Literacy and Essential Skills Tools*, http://www.hrsdc.gc.ca/eng/consultations/reports/les.shtml
Human Resources and Skills Development Canada, *Literacy and Essential Skills*, August 2010, http://www.hrsdc.gc.ca/eng/workplaceskills/LES/index.shtml

The Canadian Council on Learning (CCL) claims Canadians are slipping down the international learning curve over the failure of provincial, territorial and federal governments to work together. As the CCL prepares to conclude its operation, it advocates the need for a national learning framework with a sustained trans-Canadian approach along with a mission, vision and model to unite Canadians in a common purpose. The vision of CCL was to link Canadians in sharing learning experiences promoting the enhancement of learning as a core value of a distinctive Canadian society. The CCL survey of attitudes towards learning reinforces the belief by Canadians that learning is the single greatest factor in individual and collective success and urges the need for leadership from organizations such as the Council of Ministers of Education.
Canadian Council on Learning (CCL), *What is the Future of Learning in Canada*, October 2011
http://www.ccl-cca.ca/CCL/AboutCCL/PresidentCEO/20111011FutureLearning.html

Canadian School Boards Association in its priorities for 2011 – 12 identifies the integration of emerging technologies into teaching and learning in Canadian classrooms, the creation of policy to promote classroom and community/industry connections, sustainability and partnerships and the promotion of research-based practices in Canadian classrooms that develop 21st century learning skills in areas such as literacy, communication, collaboration, critical-thinking and problem solving. **Canadian School Boards Association**, *Priorities* 2011 – 2012,
http://cdnsba.org/advocacy/priorities

Council of Ministers of Education at its 96th meeting began to discuss the global movement to integrate 21st century competencies in public education and determine what they could do to advance 21st century learning models in Canada. Ministers agreed on Canada's key priorities on four themes for upcoming OECD discussions, including equipping teachers for the 21st century and matching skills to new needs. The CMEC 99th meeting focused on the progress of its *Learn Canada 2020* joint 2008 declaration and guiding document. Ministers received information from the Canadian School Boards Association about its priorities for 21st century learning and shared how provinces and territories are addressing the skills.
Council of Ministers of Education, Canada's Ministers of Education Advance Learn Canada 2020 Priorities, Winnipeg, September 24, 2010 http://www.cmec.ca/Press/2010/Pages/2010-09-24-2020.aspx
Council of Ministers of Education, Canada's Ministers of Education Move Ahead on Pan Canadian Priorities, Toronto, February 23, 2011 http://www.cmec.ca/Press/2011/Pages/2011-02-23.aspx

BRITISH COLUMBIA: The Liberal government identifies key priorities of job creation, families first and leading an "open data" platform in preparing students for jobs of tomorrow. "Regular town hall meetings" and social media offer a voice to British Columbians to inform the work of government in creating a strong economy to unify diverse family needs.
The Premier's Technology Council (PTC) offers an ideal vision for transformational change elements required by its education system in meeting the urgent needs of a knowledge-based society. Skills and attributes for the 21st century are identified along with transformations required to current practices, systems and roles.
Premier's Technology Council (PTC) A Vision for 21st Century Education, December 2010
http://www.gov.bc.ca/premier/technology_council/

ALBERTA: Education is identified as a priority of a Conservative government as Alberta heads into an election in 2012. Revised education legislation following the first reading of Bill 18, *A 21st Century Transformation* is built on a series of initiatives driven by 21st century competencies and foundations. November 2011 to January 2012 public consultations, written letters and provocations using social media reflect a strong emphasis on 21st century key elements and processes for a new legislation to govern Kindergarten to graduation.
Government of Alberta, *Our Children Our Future Getting it Right, Education Act Session Pre-reading 11.21.11*, http://ideas.education.alberta.ca/engage/current-initiatives/education-act-getting-it-right

In its steering committee report on *Inspiring Action on Education April 2010*, Alberta Education presses for a vision that describes how educate Albertans see themselves in the future, as engaged thinkers and ethical citizens with an entrepreneurial spirit. A shift in education requires a focus on learners, core 21st century competencies and technology to support the creation and sharing of knowledge along with an understanding that education expands beyond the school.
Government of Alberta, *Inspiring Education: A Dialogue with Albertans* Steering Committee Report Committee Report to the Minister of Education, June 2010.
http://www.inspiringeducation.alberta.ca/

The Discussion Paper, *We Engage Engager* provided the rationale for the vision, values and principles along with definitions of the core competencies along with a visual of the 21st century framework.
Government of Alberta, *Inspiring Action on Education We Engage Engager*, June 2010.
http://ideas.education.alberta.ca/engage/current-initiatives/education-act-getting-it-right

Alberta Education's Curriculum Redesign initiative presents a Framework for Student Learning articulating 21st century outcomes along with standards, guidelines and an articulated process for curriculum design, engagement, and implementation. The framework presents a circular model defining the relationships between subject disciplines essential for students to achieve the "Three Es: Engaged Thinkers and Ethical Citizens with an Entrepreneurial Spirit" placing the student at the centre of the decision-making, and providing "I" statement indicators for achievement.
Government of Alberta, *Framework for Student Learning Competencies for Engaged Thinkers and Ethical Citizens with an Entrepreneurial Spirit*,
http://education.alberta.ca/department/ipr/curriculum/framework.aspx

Stakeholder consultations on the student learning framework focused on key concepts around three common understandings; One: Literacy, numeracy and interdisciplinary learning, Two: Ways of Knowing, Student centred, personalized learning, and Three: Flexible timing and pacing in a variety of learning environments and Assessment. Stakeholders included the Alberta Teachers Association, Alberta School Councils and School Boards, Alberta School Superintendents, First Nations, Metis and Inuit and other education and community members.
Government of Alberta, *Summary of Findings Research Roundtables 1, 2 and 3*,
http://education.alberta.ca/department/ipr/curriculum/engagement.aspx

MANITOBA: The recently re-elected NDP Government in its October 2011 throne speech, committed to the modernization of school facilities including science labs, gyms, shop equipment, increased internet broadband access to rural divisions and a new skills and technology centre. The Action Plan for Science Education is a department initiative to encourage student engagement and professional development through a 21st century approach to science learning. Partnership initiatives, including the St. Boniface General Hospital Research Foundation along with funding opportunities are cited.
Manitoba Education, *An Action Plan for Science Education in Manitoba*,
http://www.edu.gov.mb.ca/k12/cur/science/action_plan/index.html

ONTARIO: The Ontario government throne speech makes no specific reference to 21st century skills or competencies, but Premier Dalton places priority on maintaining Ontario's schools as the best in the English speaking world with its recent move to full day kindergarten. Ontario students are among the highest achievers in the country, crediting smaller class sizes, family literacy centres and online tutoring. Its plan is to build the best-educated workforce in the world.
Government of Ontario, Ontario Students Lead the Way,
http://news.ontario.ca/edu/en/2011/11/ontario-students-lead-the-way.html

The Ontario Ministry of Education hosted more than 600 delegates representing every level and sector of education from 8 countries gathered at the "Whole System Reform Summit." Co-chairs, Sir Michael Barber and Michael Fullan summarized key issues along with an overview grid of contexts, goals and actions of 5 jurisdictional case studies presented. They identify "21st –century skills," "soft skills," well-rounded education," or broad definitions of literacy and numeracy common to jurisdictional action, along with an aim to put more focus on individual students, engagement and needs. Barber and Fullan offered debate over 4 tensions; assessment, curriculum, merit pay and autonomy, identifying 3 challenges: 7 key components to system

reform, deliberate practice, and centralized versus decentralized autonomy. They recommend a path of starting contexts, concrete pathways to success and clustered interventions.
Michael Fullan and Sir Michael Barber, Co-chairs, *Final Report for the Building Blocks for Education Whole System Reform September 13-14, 2010 Toronto*, Ontario,
http://www.edu.gov.on.ca/bb4e/materials.html

Catherine Fife, President of the OPSBA, identifies that the challenge is about what learning should look like in 21st century classrooms. What is missing is a provincial vision that describes how technology can be used to: promote innovative thinking and collaborative work; incorporate rich digital resources into student learning; employ varied assessment methods to improve learning; model ethical practices in the digital age and strengthen professional development. The OPSBA calls for continued review of the Discussion Paper *What if? Technology in the 21st Century Classroom* with the province to address the question of how schools can be connected and relevant for students in a global community and to explore the relationship between using technology and enhancing the teaching and learning process.
Ontario Public School Boards Association, The Debate on Banning Cell Phone Misses the Mark, September 16, 2010,
http://www.opsba.org/index.php?q=news/the_debate_on_banning_cell_phones_misses_the_mark
Ontario Public School Boards Association, *What if? Technology in the 21st Century Classroom*, April 29, 2009,
http://www.opsba.org/index.php?q=news/what_if_technology_in_the_21st_century_classroom

Jenson, Taylor and Fisher report that despite massive investments, there is little evidence of its impact on student achievement. Research points to inconsistent and inconsequential implementation of ICT to advance 21st century skills. Technology continues to be used primarily for administration rather than instruction; there is little systematic professional development for pre-service or in-service teachers on ICT-based instruction and few accountability measures exist for reporting on teachers' efforts to integrate ICE in instruction; initially cited by Larry Cuban in his 2001 publication of Oversold and Underused: Computers in the Classroom.
Jenson, Taylor and Fisher, Critical Review and Analysis of the Issue of "Skills, Technology and Learning", Faculty of Education, York University.
http://www.opsba.org/index.php?q=advocacy_and_action/technology_in_teaching_and_learning JensonFinalReport.pdf

QUEBEC has identified economic development as a major priority along with health, family and sustainable development. The Department of Education and Sport will see an increase in funding with all schools (90%) receiving interactive display boards, teaching materials and teacher training.
Government of Quebec, *2011 to 2012 Budget Speech*,
http://www.budget.finances.gouv.qc.ca/Budget/2010-2011/index_en.asp

NEW BRUNSWICK: The government in its throne speech identifies a need to create a new foundation to address a shifting population, the expectations of new standards and technology and economic development strategies through public-sector engagement. Public consultations began on January 11, 2012, guided by Learning Everybody's Project founded on four pillars of learning to know, to do, to live together and to be, each containing skill competencies for learning at home, at school, at work, in the community. Standards and guidelines for beginning teachers reflect the province's shift in public education to a 21 Century model of learning.
Government of New Brunswick, Throne Speech 2011, http://www2.gnb.ca/content/gnb/en.html
Government of New Brunswick, Learning Everybody's Project, http://www.learninginnb.ca

Department of Education and Early Childhood, 21st Century Standards of Practice for Beginning Teachers in New Brunswick, http://www.gnb.ca/0000/pub-e.asp

NOVA SCOTIA: The Minister of Education's September 2, 2011 opening school day message focused on cyber bullying and the fight for safety on the internet and mobile devices. The government's support for literacy intervention support and family services was noted. The Department of Education in its Statement of Mandate proposes to work with local boards to improve student engagement, positive school culture in addition to working with the Nova Scotia Educational Leadership Consortium to develop principals in supporting effective instruction.
Government of Nova Scotia, Department of Education Statement of Mandate 2011 – 2012
http://www.ednet.ns.ca/business_plans.shtml?id=1

PRINCE EDWARD ISLAND: The Liberal government credits its full-day kindergarten and increasing attendance in post secondary education as indicators of social success. Its platform goal for education is to offer young learners the best tools in a changing world.
Liberal Party Policy Platform, September 2011
http://www.movingforwardpei.ca/news/79/72/Liberal-Policy-Platform/

The Minister of Education invited 250 education, business and community leaders, parents and students to gather ideas, direction and commitment what Island learners require in order to be successful in the 21st Century. Consensus points included: identifies an emphasis on student-centred Project Based Learning. Relationships are credited as key in sustaining learning and a model is suggested to involve community, school and social contacts, home and family, and students. 24 themes grouped in three skill categories: learning, literacy and life were presented by Charles Fadal from his book 21st Century Skills.
Government of Prince Edward Island, Proceedings of the Minister's Summit on Learning, June 4 and 5, 2010, Department of Education, http>//www.gov.pe.ca/eecd/index.php3?number=1035077&lang=E

NEWFOUNDLAND: The Speech from the Throne pledges additional budget support for technology resources to support 21st century learning, along with investments in infrastructure and programming to tailor teaching to diverse student needs. The Department of Education makes no direct statement to address 21st century learning in its identification of 4 strategic enhancement issues for inclusive social and economic success: early childhood and select Kindergarten to Grade 12 enhancements, post-secondary programs and skilled trade training, infrastructure improvements across all levels and increased access to literacy learning opportunities for adults.
Government of Newfoundland, *Department of Education 2011-2013 Strategic Plan*, April 29, 2011.
http://www.exec.gov.nl.ca/thronespeech/2011/speech2011.htm#newways

YUKON: In its third mandate, the Government of the Yukon directs its support to early learning and parenting support along with along with meeting the demand for more educational facilities and training programs to train Yukoners for Yukon opportunities. The Department's Strategic Plan offers recommendations for the structure and delivery of experiential education as well equitable access of programs to all students addressing gaps in learning among males and females and First Nation and non-First Nation students. Professional Development for educational assistants, teachers and administrators in best-practices and practical skill development and alignment to resources is a priority.
Government of Yukon, Speech from the Throne, December 01, 2011, http://www.yukonpremier.ca/
Yukon Department of Education, Department of Education Strategic Plan 2011 – 2016: Our Commitment to New Horizons, http://www.education.gov.yk.ca/psb/strategic_plan.html

NORTHWEST TERRITORIES: The 2011 – 2012 budget provides support to educational opportunities for students including volunteer and leadership development opportunities such as public speaking and Youth Ambassador Programs. A commitment is made to increase the number of Aboriginal teachers and language and culture teachers to confirm beliefs about student success. Government of the Northwest Territories, *The Budget Address*, http://www.fin.gov.nt.ca/address/index.htm

NUNAVUT: The government of Nunavut, in its deficit budget, struggles to address poverty needs, housing and provide support to an education system which keeps its students in school. Government of Nunavut, 2011 – 2012 Budget Address, http://www.gov.nu.ca/en/PDocuments.aspx

UNITED STATES

United States Department of Education and Partnership for 21st Century Skills, *Learning for the 21st Century A Report and Mile Guide for 21st Century Skills, (2009)* http://www.p21.org/overview/skills-framework, provides the framework, foundation, tool, and resource links for the Route 21 participating states.

21st Century Skills Leadership States include: Arizona, Illinois, Iowa, Kansas, Kentucky, Louisiana, Maine, Massachusetts, Nevada, New Jersey, North Carolina, Ohio, South Dakota, South Carolina, West Virginia and Wisconsin. Each state member has committed to a readiness plan which commits to 21st century standards, assessment and professional development. Strategies for success include leadership and vision, communication and an aggressive implementation plan. *21st Century States*, http>//www.p21.org/state-initiatives/overview-of-state-work

INTERNATIONAL

Organization for Economic Cooperation and Development (OECD): Ananiadou and Claro provided information about surveyed responses from 17 OECD countries providing a framework of 21st century competencies and technology to guide reform or innovation of teaching and learning in the classroom. The report defines competencies around in three dimensions of *information, communication and ethics and social impact*. The majority of countries reported to have their guidelines or frameworks in legislation or national curriculum, but only three countries report any assessment policies or guidelines in place for these skills. Few countries provided clear definitions of skills and competencies and integrated them in a cross-curricular manner. Few training or in-service programs were offered to target the development of 21st learning for teachers. Ananiadou, K. and M. Claro (2009), *21st Century Skills and Competences for New Millennium Learners in OECD Countries, OECD Education Working Papers*, No. 41, OECD Publishing. http://dx.doi.org/10.1787/218525261154

While many countries have reported curriculum reforms incorporating digital competencies, teacher education has not been included in either articulation or implementation. Competency standards for teachers are not well-defined and do not endorse a vision of what teaching and learning in a knowledge society should be and what supporting role technology should take. Survey information provided by 10 countries along with research from 31 OECD countries was analyzed and cited in the report.

Rizza, C. (2011), "ICT and Initial Teacher Education: National Policies", *OECD Education Working Papers*, No. 61, OECD Publishing. http://dx.doi.org/10.1787/5kg57kjj5hs8-en
Rizza in her report on teacher education

WALES: The Welsh Assembly Government and the Welsh Local Government Association and local authorities have collaborated to commit resources to support a set of 21st century standards including school and playground design needed to transform learning environments and encourage play and experiential learning. A School Effectiveness Framework requires and guides local school planning for the creative and innovative use of ICT to achieve a list of key elements such as the entitlement of students to use technology within and beyond school, engagement, professional development and data to support learning progress and plan performance. Scenarios of alternate practice and exemplars of school grounds in included.
Welsh Assembly Government, *21st Century Schools Information Document*, May 2010, www.wlga.gov.uk/english/21st-century-schools-programme
Welsh Assembly Government, 21st Century Schools Transforming the Learning Environment http://21stcenturyschools.org/21schoolstandard/teachinglearningict/?lang=en

FINLAND: The Ministry of Education makes no formal mention of 21st century learning in its current educational plan, strengthening the development of positive outcomes for students and social emotional learning through the development of activities linked to school work. Creativity, social skills, innovativeness, problem solving capacities and information management skills are to be developed through diverse and didactic learning environments and methods as a means for students to achieve positive outcomes on national curricula and to create opportunities for students to influence and participate in their learning. Information and communication technology and digital environments are to be used and teacher development plans reflect this need.
Finland Ministry of Education, Education and research 2007 -2012 Development Plan, 2008:11
Finland Ministry of Education, *Key Competencies for lifelong learning in Finland Education 2010 - Interim Report*, 7 May 2009 http://www.minedu.fi/OPM/Koulutus/koulutuspolitiikka/?lang=en

SINGAPORE: The Ministry of Education has announced a framework to develop 21st century skills. At the centre core of the circular framework are core values surrounded by the 5 social emotional learning competencies. The 21st century skills of Information and Communication Skills, Critical and Inventive Thinking and Civic Literacy, Global Awareness and Cross-cultural Skills form the next ring, leading to student outcomes of a confident learner, self-directed learner, concerned citizen, and active contributor.
Singapore Ministry of Education, *Nurturing our Young for the Future Competencies for the 21st Century*, March 9, 2010 http://www.moe.gov.sg/

The Infocomm Development Authority (IDA), a statutory board of the Singapore Government made a commitment to achieve 90% broadband usage in all homes with 100% computer ownership in homes of school-aged children by 2015 in its Intelligent Nation (iN2015) Master plan.
Info-communications Development Authority of Singapore, Empowering Learners and Engaging Minds through Infocomm A Report from the iN2015 Education and Learning Sub-Committee, June 2006
http://www.ida.gov.sg/doc/About%20us/About_Us_Level2/20071005103551/03_Education_and_Learning.pdf

AUSTRALIA: The international ATC21S project defines a timeline and five phases of collaboration to develop and pilot a series of learning progressions from novice to expert on selected 21st century competencies and ICT literacies for public domain sharing. Stakeholders are researchers, students, teachers from founder countries, Australia, Singapore, Finland, and the United States. A series of white papers provide a research foundation on the topics of 21st century skills, methodology and technology, custom learning environments and formative evaluation and Policy Frameworks for New Assessments. The project has identified skills and competencies in *ways of thinking, ways of working, tools for working and skills for living in the world*. Learning progressions for *collaborative problem solving and learning in digital networks* are currently under development.
University of Melbourne, *Assessment and Teaching of 21st Century Skills Project*, http://atc21s.org/index.php/about/timeline/

UNITED KINGDOM: The Education Secretary announced the scrapping of the ICT curriculum in favour of teachers developing what and how to teach and use relevant and exemplary material available on the web to be truly competitive in the digital age. Companies such as Microsoft, Google and Cambridge University are working with organizations like the British Computer Society to produce free material for school use. Facebook endorsed the government's plan and is working with partners to develop a program for students to design and build social applications. New programming is to be underway in September 2012 along with funding for teacher training and continual professional development.
Department for Education, *"Harmful" ICT curriculum set to be dropped this September to make way for rigorous Computer Science*, January 11, 2011, http://www.education.gov.uk/a00201864/harmful-ict-curriculum-set-to-be-dropped-this-september-to-make-way-for-rigorous-computer-science

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