

What 21st Century Learning? A review and a synthesis

Punya Mishra

punya@msu.edu

Kristen Kereluik

kereluik@msu.edu

Michigan State University

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What exactly is 21st Century Learning? It seems somewhat awkward asking this question given that we are already a decade into the 21st Century. That said, the phrase “21st Century Learning” has become an integral part of educational discourse. There is a feeling that there is a distinct disjuncture between the centuries that have past the one that we are emerging into, and that the educational demands of this new century require new ways of thinking, teaching and learning. Recently there have been a spate of books and reports that criticize the current goals and practices of schooling (Keengwe, Onchwari & Wachira, 2008; Kozma, 2003; Zhao, 2009). These authors and groups suggest that schooling needs to be fundamentally reconfigured to emphasize higher order cognitive processes such as critical thinking, creative problem solving, curiosity, and adaptability. In parallel to this there are individuals and groups who offer a range of suggestions for what are broadly labeled “21st Century Skills.” These recommendations emerge from educators such as Howard Gardner, popular writers such as Daniel Pink, organizations such the Partnership for 21st Century Learning or the European Union.

As the phrase 21st Century Skills is thrown about it is unclear as to exactly what this phrase actually means. In some sense, the whole idea of 21st Century skills becomes an empty signifier, a term that we all think we understand and yet are hard-pressed to clearly define. Do these frames or definitions have anything in common or are they quite different from each other? How are these 21st Century frames different from the overarching goals of education as had been espoused in the past? Critics of this new 21st Century orientated discourse argue that this emphasis on the new century is just another form of

chronocentrism, a mistaken belief that “a certain state of humanity is superior to all previous and/or future times” (Wikipedia, 2010). According to this perspective, our educational goals are not all that different from the goals of previous generations.

In this paper we offer a critical review of the literature on 21st Century Skills by conducting a comparative analysis of the differing frameworks that have been offered. We then code the individual elements of each of these frameworks to determine similarities and differences and through that develop a set of overarching categories that attempt to integrate these different perspectives and through this process offer a coherent integrative framework that would help anchor our understanding of this term.

Introducing the frameworks

We identified 10 different reports /books that seek to identify the kinds of knowledge required to succeed in the 21st Century. The list is given below, and as is clear it includes reports from educational organizations such as the American Association of Colleges and Universities, the Center for Public Education, the International Society for Technology in Education and The Partnership for 21st Century Skills; international bodies such as the European Union; business interests such as the Organization for Economic Cooperation and Development & the Metiri Group; individual scholars such as Howard Gardner, and Yong Zhao, popular writers such as Daniel Pink. Below we offer short summaries of each of these approaches.

American Association of Colleges and Universities. (2007). *College learning for the new global century*. Washington, DC: AACU. [Referred to in the rest of the paper as AACU]

The American Association of College and Universities framework for college learning in the 21st century outlines essential aims, learning outcomes, and guiding principals for college education in the 21st century. According to the AACU college education is now more important to individual success and American’s future as a global leader than ever before. The framework is born out of the assumption that the world is being reshaped by technology and globalization and seeks to answer the question of *what matters in college?* The framework identifies learning outcomes for college education necessary for 21st century success and includes, knowledge of human cultures, physical, and natural world, intellectual and practical skills, personal and social responsibility, integrative learning.

Gardner, H. (2008). *5 minds for the future*. Boston, MA: Harvard Business Press. [Referred to in the rest of the paper as Gardner]

Gardner’s *new minds* rest on the assertion that the new millennium was a time, and continues to be a time of immeasurable changes so prominent in the lives of individuals and society at large that the

effects will be felt long into the future. The changes of the new millennium were ushered in following advancements in science and technology and subsequent globalization. According to Gardner these changes necessitate new education processes, as our educational system is not designed to respond to the needs of the new digital and global age. Education needs to adapt to stretch and shape the minds of learners in five ways that will lead into the future. Gardner's disciplined mind is the master of at least one domain and through mastery achieves autonomy. The synthesizing mind takes information from disparate sources and domains, evaluates the information and reorganizes it in new ways, a skills necessary for success in the new age because of the vast amount of easily accessible information. The creating mind puts forth new ideas and asks and seeks answers to important un-asked questions, and in doing so stays ahead of computers and robots who rely on rule-governed logic. The respectful mind welcomes and encourages differences among individuals, a skill necessary as the world is now linked and has no place for intolerance or disrespect. Gardner's final *new mind* is the ethical mind, which works beyond self-interest and contemplates one's work in conjunction with the needs of society at large.

International Society for Technology in Education (2007). *The national educational technology standards and performance indicators for students*. Eugene, OR: ISTE. [Referred to in the rest of the paper as ISTE]

The International Society for Technology in Education student educational technology standards are a roadmap to effective teaching and professional growth in an increasingly technology driven world. According to ISTE technological literacy is crucial to success in a modern, globalized world, which places a premium on highly skilled labor. ISTE standards include higher-order thinking skills and skills for digital citizenship crucial to be effective lifelong learners and productive members of globalized society. Education must adapt and provide students with the skills necessary for digital age professionalism, skills built on a base of solid technology literacy. Technology literacy includes knowledge of technology systems as well as the ability to apply knowledge in authentic ways for authentic purposes. ISTE standards include broad categories such as, the ability to demonstrate creativity and innovation, communicate and collaborate, conduct research and use information, think critically, solve problems, and make decisions, and use technology effectively and productively.

Jerald, C.D. (2009). Defining a 21st century education. Retrieved October 29, 2010, from [http://www.centerforpubliceducation.org/atf/cf/%7B00a4f2e8-f5da-4421-aa25-3919c06b542b%7D/21ST%20CENTURY\[1\].JERALD.PDF](http://www.centerforpubliceducation.org/atf/cf/%7B00a4f2e8-f5da-4421-aa25-3919c06b542b%7D/21ST%20CENTURY[1].JERALD.PDF) [Referred to in the rest of the paper as CEP]

The Center for Public Education's attempt to define a 21st century education is rises from the notion that technology is changing the world through automation and globalization. The CPE asserts that technological automation has already replaced *doing* tasks and is now beginning to replace *thinking* tasks in which information can be broken down and digitally translated and outsourced. As such, non-routine skills such as expert thinking and complex communication are essential for success in the 21st century. The CPE identifies three realms of necessary knowledge and skills, foundational knowledge in subject matter, literacy or ability to apply academic knowledge to real world problems, and the competence to call on knowledge and literacies as needed in both personal and professional realms.

Metiri Group. (2003). enGauge 21st century skills for 21st century learners. Retrieved October 29, 2010 from <http://www.metiri.com/21/Metiri-NCREL21stSkills.pdf> [Referred to in the rest of the paper as MG]

The Metiri group's enGauge 21st century skills framework is built on the premise that students need new skills to survive and thrive in a rapidly changing digital world. The Metiri group asserts that their framework is built on research, and calls from governments and industry to define the skills necessary for success in the 21st century. The enGauge framework consists of 4 main realms of necessary knowledge, all conceptualized within a frame of high academic standards. Digital age literacies, include the ability to use digital technology to organize and evaluate the vast amount of information available in the digital age. Inventive thinking and high-level cognitive skills is essential for success in the 21st century, as technology has simplified routine tasks placing greater importance on complex cognitive skills. Effective communication is necessary as technology has enabled widespread communication and collaboration and high productivity determines success in the workforce.

Organization for Economic Cooperation and Development. (2005). *The definition and selection of key competencies: Executive summary*. Paris, France: OECD. [Referred to in the rest of the paper as OECD]

The Organization for Economic Cooperation and Development key competencies arise out of a need to define and assess key competencies necessary for success in a newly challenging and complex society. Globalization and modernization have created a diverse and interconnected world, key competencies allow individuals to make sense and meet the demands of such a world. The OECD framework includes three main realms in which individuals must possess knowledge and skills, using tools interactively, interacting in heterogeneous groups, and acting autonomously and rests on reflective thought and action. According to the OECD using tools, such as language and technology, interactively is necessary to stay current with technology, effectively utilize tools, and collaborate effectively.

Interacting in heterogeneous groups is necessary for effective collaboration and management of interpersonal relationships. Acting autonomously is not functioning in isolation, rather it includes awareness of one's environment, realization of one's goals, and acting responsibly.

Partnership for 21st Century Skills. (2007). Framework for 21st century learning. Retrieved October 29, 2010, from http://www.p21.org/documents/P21_Framework_Definitions.pdf [Referred to in the rest of the paper as P21]

It is the stated mission of the Partnership for 21st Century Skills to position 21st century readiness at the center of K-12 education in the United States. The framework developed by P21 is constructed from a solid foundation of content knowledge, and supported by specific skill, expertise, and literacies necessary for success in personal and professional domains. Within the foundation of core content knowledge exist the essential skills for success in a highly digital and globalized world, skills such as critical thinking, problem solving, communication and collaboration. The P21 framework is born out of the assumption that individuals now live in a technology rich environment, which brings with it an abundance of information, rapid advancements in technology, and unprecedented ability to communicate and collaborate with individuals around the world. To be successful in the new digital and globalized world of the 21st century individuals must possess and utilize a wide range of learning and innovation skills related to information, media and technology. P21 asserts that learning and innovation skills are currently recognized as skills that separate students who are prepared for life and work in the 21st century, and those who are not, a separation that stands to become more apparent as the demands for success continue to increase. In addition to the P21 framework of necessary knowledge and skills, P21 also advocates for 21st century support systems for educators and students, including 21st century curriculum and instruction, 21st century professional development, and 21st century learning environments.

Pink, D.H. (2005). *A whole new mind: Moving from the information age to the conceptual age*. New York: Riverhead Books. [Referred to in the rest of the paper as Pink]

According to Pink the future belongs to right-brainers, or those individuals who possess the conceptual skills to be successful in an increasingly conceptual age. Pink's senses arise from the assertion that a definitive shift is taking place in the advanced world, one from a logical technical age to conceptual age, which places a premium on knowledge. Pink's senses include design to change the world in significant ways, story or narrative imagining focused on understanding, symphony and synthesis, empathy, play, and the pursuit of meaning.

Recommendation of the European Parliament and of the Council of the European Union on key competences for lifelong learning, L394/10 C.F.R. (2006, December 12). Retrieved October 29, 2010, from http://ec.europa.eu/dgs/education_culture/publ/pdf/ll-learning/keycomp_en.pdf [Referred to in the rest of the paper as EU]

The Recommendation of the European Parliament and of the Council of the European Union on key competences for lifelong learning are a combination of knowledge, skills and attitudes necessary for personal fulfillment, successful integration into society, and productive employment. The eight key competencies allow for flexibility and increased adaptation of individuals and the workforce to the ever changing and increasingly complex world. Communication in the mother tongue, communication in foreign languages, mathematical and scientific competence, digital competence, learning to learn, social and civic competence, sense of initiative and entrepreneurship, and cultural awareness and expression are essential for success in the digital and globalized world and while they represent different realms of competence are all interdependent.

Zhao, Y. (2009). *Catching up or leading the way*. Alexandria, VA: ASCD. [Referred to in the rest of the paper as Zhao]

Zhao asserts that America, and the American education system, need to adapt to a newly globalized and ever changing digital world to remain a leader in the 21st century. In a review over several framework which purport knowledge and skills necessary for success in the 21st century, Zhao attempts to identify the needs of the learners in the 21st century. Zhao presents five assumptions that need to be a driving force behind educational reform. The first assumption is that educators must cultivate skills and knowledge within students that cannot be reduced and reproduced by machines or outsourced overseas. The second assumption asserts that creativity and adaptability are essential for living in a new globalized and digital age. The third assumption is that the ability to effectively communicate and collaborate is essential for living in a global society. The fourth assumption is that complex cognitive skills are more important than memorization. The fifth and final assumption is that emotional intelligence is an essential component to effective communication and collaboration.

Looking across the different frameworks

These 10 reports and books offer different perspectives on what is meant by 21st Century learning, from developing technology skills to a global perspective. In order to see the broader themes that cut across these different frameworks, we broke apart these frameworks in to individual elements. These individual pieces were then reviewed and re-categorized with an eye for emergent themes. Our review led to our identifying 3 broad categories with three sub-categories within them. The three broad

categories are: Foundational Knowledge; Meta Knowledge; & Humanistic Knowledge. We describe each of these over-arching categories and the subcategories in greater detail below.

1. Foundational knowledge

This category is the answer to the “what” question i.e. “What do students need to know?” The frameworks we reviewed saw this in terms of three key sub-categories.

- 1.1 Core Content Knowledge
- 1.2 Information Literacy
- 1.3 Cross-disciplinary knowledge/ synthetic knowledge

1.1 Core content Knowledge

Core content knowledge and high academic achievement in traditional domains are among the most frequently cited essential skills for success in the 21st century. Excellence in traditional academic domains such as English, mathematics, science, history, economics, geography, and government are considered to be the foundations upon which other 21st century skills are to be developed. Past high academic achievement and knowledge of subject matter, disciplined way of thinking, reasoning, and understanding the world are reported as essential for success in a highly complex new digital age. Disciplined ways of thinking is characterized by highly complex and deeply ingrained mental processes specific to traditional domains, such as applying mathematical ways of thinking to solve everyday problems or applying scientific ways of thinking to understanding the natural world (Gardner, 2008).

High Academic Standards	MG
Mathematical and Scientific Competence	EU
Core Subjects	P21
Financial and Business Literacy	P21
Quantitative Literacy	AACU
Environmental Literacy	P21
Health Literacy	P21
Civic Literacy	P21
Disciplined Mind	Gardner
Advanced Knowledge in Traditional Subjects	CPE

1.2. Information Literacy

Information literacy, like core content knowledge is among the most cited skills necessary for success in the 21st century. Often called *digital* literacy, information literacy most often involves the skills necessary to effectively seek out, organize and process information from a variety of media. Information literacy was deliberately chosen to include all types of media, while media is increasingly becoming digital, print media is still quite prevalent and understanding of such is necessary for academic and economic success. Information literacy also includes a component of responsible use of technology and media, an important moral and ethical consideration beyond understanding basic ICT systems and media forms.

Technology Concepts and Operations	ISTE
Digital Competence	EU
Digital Age Literacy	MG
Using Tools Interactively	OECD
Information Literacy	AACU
Information Literacy/Media Literacy	P21
Research and Information Fluency	ISTE
Digital Citizenship	ISTE

1.3. Cross-disciplinary knowledge / Synthesis

Synthesis most often involves the ability to synthesize information across fields or domains and is demonstrated through the application of knowledge to new contexts in the pursuit of specific end goals. Synthesis is possible through several means including narratives which speak directly to the human need to connect with others and for meaning. Synthesis is asserted to be crucial to success in the 21st century as it also involves the ability to understand, organize and connect the vast amounts of information now available with the advent of digital media.

Synthesizing Mind	Gardner
Symphony	Pink
Synthesis Across Studies	AACU
Meaning	Pink
Story	Pink

2. Meta knowledge

This category is about knowledge of how to work with the foundational knowledge, the process as it were. These could also be seen in terms of three sub-categories.

2.1 Problem solving / Critical Thinking

2.2 Communication / Collaboration

2.3 Creativity / Innovation

2.1. Problem solving & Critical Thinking

Problem solving and critical thinking most often involve the cognitive skills necessary for success in economic and social domains. Critical thinking frequently involves the ability to interpret information and make informed decisions based on such information. Problem solving is often conceptualized as the use of critical thinking skills towards the effective resolution of a specific problem or towards a specific end goal.

Critical Thinking	EU
Critical Thinking, Problem Solving, Decision Making	ISTE
Critical Thinking	P21
Cognitive Skills	Zhao
Inquiry and Analysis	AACU
Risk Assessment	EU
Decision Taking	EU
Problem Solving	EU
Ability to Think Critically and Solve Problems	CPE

2.2. Communication / Collaboration

Communication and collaboration are cited as essential to success in the 21st century as working with diverse groups becomes of the utmost important in our increasingly globalized culture and economy. Communication most frequently involves the ability to clearly articulate oneself through all mediums of communication, oral, written, and non-verbal media. Communication also involves the skills necessary to be an active and respectful listener to diverse audiences. Communication in the 21st century is often cited as including the ability to effectively use digital media to communicate and collaborate with others. Collaboration includes similar dimensions as communication, working respectfully and effectively but also includes important individual contributions as well such as flexibility, willingness to participate, and recognition of group and individual efforts and success.

Communication in Mother Tongue	EU
Communication and Collaboration	ISTE

Communication	P21
Communication	AACU
Effective Communication	MG
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Interacting in Heterogeneous Groups	OECD
Teamwork and Problem Solving	AACU
Collaboration	P21

2.3. Creativity & Innovation

Creativity too is among the most often cited skills as necessary for success in the 21st century. It is often reasoned that the highly complex problems facing society in the 21st century necessitate new and creative solutions. Creativity and innovation involved applying a wide range of knowledge and skills in the generation of novel and worthwhile products (tangible or intangible). Creativity and innovation often include critical components as well. Creativity and innovation include the ability to evaluate the effectiveness of ideas and products, elaborate on existing ideas products, and refine ideas and products in pursuit of specific end goals.

Inventive Thinking	MG
Creativity	EU
Creativity and Innovation	ISTE
Creativity	Zhao
Creativity	P21
Critical and Creative Thinking	AACU
Initiative/Entrepreneurship	EU
Creating Mind	Gardner
Play	Pink
Design	Pink

3. Humanistic Knowledge

This is a humanistic theme that emerged through our analysis of the various frameworks. This form of knowledge offers a vision of the learner's self and its location in a broader social and global context.

- 3.1 Life / Job skills;
- 3.2 Cultural competence;
- 3.3 Ethical / Emotional Awareness

3.1. Life/Job skills

Job and life skills are those that serve to create lifelong learners, capable of success beyond the confines of the classroom. Job and life skills are most often cited as including those skills required of effective lifelong learning center around three realms, those that serve to effectively manage and organize one's efforts, those that serve to coordinate and organize relevant and important information, and those that serve in the development of end products (tangible and intangible) in the pursuit of the resolution of specific solutions to relevant problems.

Skills that Cannot be Outsourced	Zhao
Learning to Learn	EU
High Productivity and Quality	MG
Foundations and Skills for Lifelong Learning	AACU
Life and Career Skills	P21
Acting Autonomously	OECD

3.2. Cultural Competence

Cultural competence, like ethical awareness, is thought to be essential for social and economic success in the 21st century because of the increased cultural diversity from globalization. It is suggested that the skill of cultural competence equip and individual to be productive contributors in a globalized society. Cultural competence most often involves appreciation of the creative expression of ideas and emotions by all types of individuals. Cultural competence also often includes aspects of person, interpersonal, and intercultural competence evidenced through effective communication and collaboration.

Intercultural Knowledge	AACU
Skills for a Global World	Zhao
Communication in Foreign Language	EU
Civic Knowledge and Engagement	AACU
Knowledge of Culture and Physical World	AACU
Social Civic Competence	EU
Global Awareness	P21
Cultural Awareness and Expression	EU

3.3. Ethical / Emotional Awareness

Ethical awareness includes the knowledge and skills necessary for success in a culturally diverse society. Ethical awareness includes the ability to imagine oneself in someone else's position and

feel *with* that individual. It also includes the ability to intuit the feelings of others, a skill that is thought to be crucial for success in the 21st century because success in social and economic realms necessitates a deep understanding of human emotions and successful human interactions.

Ethical Reasoning	AACU
Empathy	Pink
Ethical Mind	Gardner
Respectful Mind	Gardner
Constructive Management of Feelings	EU
Initiative	EU
Emotional Intelligence	Zhao

Conclusion

Our review of 10 of the most significant frameworks of 21st Century Learning have led us to a new categorization – of three overarching categories with three sub-categories under each. There are three key contributions we can point to, as a result of this review of existing frameworks for 21st Century learning.

First, this review of the existing frameworks shows both the diversity in these approaches (compare for instance Daniel Pink’s categories to those offered by the Partnership for 21st Century Skills) as well as interesting commonalities. This can be seen by the fact that each of the categories we came up with had multiple entries from different frameworks.

Second, it is clear that not all of the knowledge and skills are unique and novel to this century. Cognitive skills such as critical thinking, problem solving, job and life skills, and synthesis have a long empirical history closely connected with academic achievement. These skills rather than being novel to the 21st century and necessary for success in the 21st century, are skills that are required for successful learning and achievement in any time, including but not limited to the 21st century. Additionally, interpersonal skills such as communication, collaboration, and ethical awareness/emotional regulation have been integral to successful interpersonal relationships for centuries. One must be able to effectively regulate ones needs and goals with that of the larger society to successfully navigate our social world. These skills are also important, and have been historically, in classrooms where there is an intricate balance between the student and the class.

Third, despite the fact that many of these skills are not unique to 21st Century learning there are some two key skills that are uniquely pressing to the 21st century. These are the sub-categories related to information literacy and cultural competence and awareness. While it is true that multiple forms of media existed prior to the dawn of the 21st century, the social, economic, and informational impact of the

Internet and digital media is unprecedented. Skills and knowledge necessary for success in the digital world are unlike those in print media. New skills and knowledge are needed at all levels of interaction with digital media. Gathering information simply the process of selecting relevant and credible information requires a unique set of skills. Once gathered, reading and comprehending information online requires different skills than reading print, it is not simply the case that good print readers are good digital readers. The Internet and digital media represent a new realm of interaction of which successful navigation is essential for success in the 21st century and once gathered and comprehended, new skills and knowledge are necessary to collaborate digitally and contribute to the collective knowledge base.

Cultural competence like information literacy takes on a new importance in the age of globalization. While working collaborative has seemingly always been essential for success, it often included individuals similar to oneself. With increased globalization and digital media individuals from diverse cultures are exposed to one another on an unprecedented level and successful collaboration is essential. Successful collaboration often necessitates cultural competence, or the ability to work productively and respectfully with diverse individuals.

We see this work being a significant contribution to the discussion on 21st Century skills. Our emergent categorization scheme gives us a “big picture” as it were of what we mean when we say 21st Century Learning. Through this we can hopefully prevent this term (outdated by a decade though it may be) from just becoming an empty signifier and actually become part of our shared understanding. Clearly the demarcation between the three categories (and the subcategories) is not clear cut – there are overlaps between them but our emergent framework does provide a clearer vision of the field – one that had been dominated by multiple, seemingly conflicting perspectives.

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