Digitally Enhanced Education in California

Briefing for the California Teachers Advisory Council

California Council on Science and Technology

March 2011

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For questions or comments on this publication contact:

California Council on Science and Technology
1130 K Street, Suite 280
Sacramento, California 95814
(916) 492-0996
ccst@ccst.us

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Executive Summary

This paper on *Digitally Enhanced Education in California* has been developed as a briefing document for the California Council on Science and Technology's California Teacher Advisory Council (Cal TAC). This document has been prepared in support of Cal TAC's October 2010 proposed initiative entitled "The Digitally Designed Class Room Without Borders." **Cal TAC's mission for that initiative is to create a dialogue between teachers and companies producing digital materials and tools as well as academia, federal laboratories, neuroscientists and others to identify newly emerging technologies offering promising innovations in digitally enhanced education and online learning with potential to empower student learning and academic performance and build increased capacity for state-of-the-art instructional design and curriculum content both within the classroom and in an alternative learning environment.**

The Cal TAC proposal is part of a lead initiative by the California Council on Science and Technology (CCST) referred to as "Innovate to Innovation (i2i)." CCST's i2i phase-one report, published in February 2011, includes a recommendation to create a California Education Innovation Consortium as an educator-driven alliance to fund, develop and deploy effective practices for K-16 digitally enhanced education and engage broader use of technology to support learning by students of varying levels and backgrounds and to train a workforce that surpasses global competition.

This White Paper includes a snapshot of leading state-level digitally enhanced education programs currently in operation serving California's K-12 or K-16 education segments; a brief summary of digitally enhanced education models in operation in various locations across California and beyond; and an inventory of California laws, regulations and policies having direct impact on delivery of digital learning in the State.

In addition, this document contains examples of new and emerging educational technology tools, applications, networks and strategies being developed and deployed by private-sector digital-learning experts, including, but not limited to, HP, IBM and Intel.

Perspectives regarding deployment of digitally enhanced education in California from both school administrators and educators are also included.

Lastly, a summary of perceived barriers and potential recommendations regarding expanded deployment of digitally enhanced education has been developed, resulting from dialogue with teachers, administrators and private-sector leaders.

I. Digitally Enhanced Education Defined

Digitally enhanced education is a multi-faceted term related to technology-based education, including, but not limited to instructional materials, virtual schools and classrooms, learning management systems, online discussion forums, online learning, digital libraries, social networks, etc.

Digital Learning Now! a December 1, 2010 report by the Foundation for Excellence in Education[1] has inventoried and adapted the following digital-learning terms, originally contained in the *Keeping Pace With Online Learning* report of 2010:[2]

- "Digital learning" is defined as any type of learning that is facilitated by technology.
- "Online learning" is instruction via web-based educational delivery systems that include software to provide a structured learning environment. This mode of learning can be a teacher-led education experience that takes place over the Internet, with the teacher and student separated geographically (also cyber learning, e-learning and distance learning).
- "State virtual schools" are created by legislation or by a state-level agency, and/or administered by a state education agency, and/or funded by a state appropriation or grant for the purpose of providing online learning opportunities across the State.
- "Virtual classroom" is a place for instructors and students to interact and collaborate in real time (synchronously). Through use of webcams, chat boxes and class discussion features, the virtual classroom resembles the traditional classroom except all participants are accessing it remotely over the Internet.
- "Supplemental online programs" provide a small number of courses to students who are enrolled in a school separate from the online program.
- "Adaptive content" refers to digital instructional materials that adjust difficulty based on user responses.
- "Social learning" includes such electronic social networks as Facebook for schools, or other social learning platforms providing messaging and content sharing among groups.
- "Blended learning" combines online learning with other modes of instructional delivery including onsite instruction; it involves a shift in delivery to an online or computer-based environment for at least a portion of the day with the goal of improving learning, staffing, and/or facilities productivity.
- "Synchronous" refers to communication in which participants interact in real time such as videoconferencing.

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[1] Digital Learning Now!, Foundation for Excellence in Education, December 1, 2010, Jeb Bush, Governor of Florida 1998 – 2007, and Bob Wise, Governor of West Virginia, 2001 – 2005. Jeb Bush and Bob Wise also launched the Digital Learning Council.

[2] Keeping Pace with K-12 Online Learning 2010 report, Evergreen Education Group, http://www.kpk12.com/about/ provides a national snapshot of the state of online learning as of Fall 2010 using original data.

[3] Keeping Pace with K-12 Online Learning 2010 report, Evergreen Education Group, http://www.kpk12.com/about/ provides a national snapshot of the state of online learning as of Fall 2010 using original data.

II. Background and Purpose

On October 20, 2010, the California Teacher Advisory Council (Cal TAC), the California Council on Science and Technology (CCST) and the Center for the Future of Teaching and Learning (CFTL) prepared a proposal to S.D. Bechtel, Jr. Foundation to support activities of the California Teacher Advisory Council (CalTAC), including a new focus on digitally designed education. The CalTAC proposal is entitled **"*The Digitally Designed Class-Room Without Borders*.**" Cal TAC's mission and priorities for this initiative include:

- Creating a dialogue between teachers and companies producing digital materials and tools; and academia, federal labs, neuroscientists and others to identify that which is either on the horizon or currently being deployed pertaining to the science and technology of learning.
- Exploring jointly with the California STEM Network (CSL Net) the concept of a "digitally designed classroom without borders." (http://californiastem.org/)

The Cal TAC proposal is part of a lead initiative by the California Council on Science and Technology, referred to as ***"Innovate to Innovation," or (i2i)***.

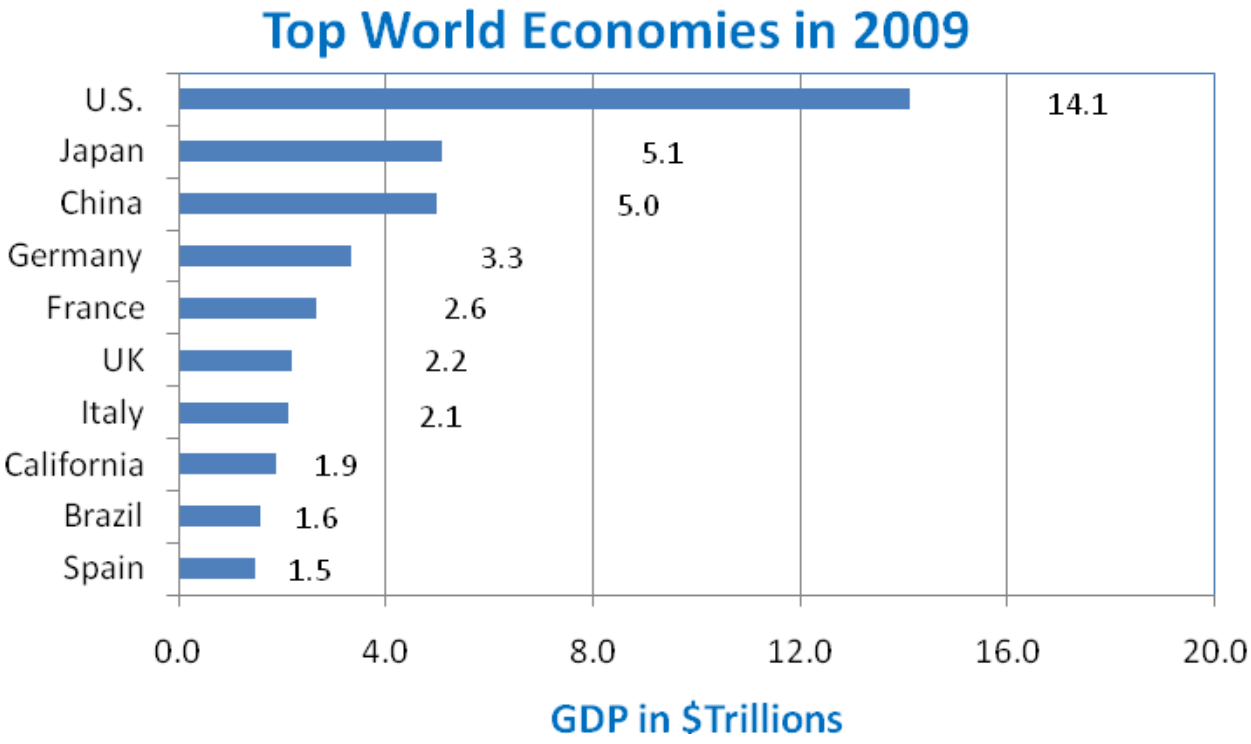
CCST's i2i initiative results from a May 2010 request by thirteen members of the California Legislature asking CCST to conduct a comprehensive assessment of California's "science and technology (S&T) innovation ecosystem" (including human capital, investment and infrastructure). CCST's i2i investigation has, to date, identified two issues critical to California that merit priority targeted focus: 1) the defining issue of water with a special emphasis on the intersection between water, climate change, energy, healthcare and food production; and 2) the creation of digitally designed education, i.e. the integration of technology in education to increase the effectiveness of California's education infrastructure, train students of varying abilities and backgrounds and prepare a workforce possessing skills meeting and exceeding those required in today's global marketplace.

The purpose of this White Paper on Digitally Enhanced Education In California is to provide an overview for Cal TAC members on:

- The current status of digitally enhanced education in California
- A snapshot of digital education models both in California and beyond
- An inventory of relevant laws, regulations and policies now in effect in California related to use of digitally enhanced education in the State
- Promising opportunities for public/private partnerships to enable California to infuse digitally enhanced education into California's statewide educational system
- Implementation challenges and recommendations for moving forward

III. Why Digitally Enhanced Education as a Priority for California

As of 2009 California ranked as the world's 8th largest economy, down from 5th in the 1990s (Source: Center for the Continuing Study of the California Economy.) The State's GDP was $1.9 trillion (GDP is value of all goods and services produced in California).



One of California's strongest assets is its diverse workforce. Much of its talent comes from outside the state and country. Compared to the United States, California depends on larger shares of foreign talent to fill its science and engineering (S&E) jobs. While foreign-born talent is expanding as a percentage of the total workforce across the U.S. and across all occupations, foreign-born talent is growing fastest as a share of S&E occupations in the State. Increasing by five percent, foreign-born S&E talent made up 38% of all S&E talent in the state in 2009, up from 33% in 2000. Across all occupations, foreign-born talent in the state increased only one percent. Nationally, foreign-born S&E talent increased three percent from 2000 – 2009.[3]

According to the United States Department of Education's National Education Technology Plan 2010,[4] "education is the key to America's economic growth and prosperity and to our ability to compete in the global economy."

> *"The Plan recognizes that technology is the core of virtually every aspect of our daily lives and work and we must leverage it to provide engaging and powerful*

[3] California Council on Science and Technology, Innovate to Innovation (i2i) report, February 2011.
[4] Transforming American Education, LEARNING Powered by Technology, National Education Technology Plan 2010, http://www.ed.gov/technology/netp-2010

learning experiences and content, as well as resources and assessments that measure student achievement in more complete, authentic, and meaningful ways."

Evidence abounds that here in California and across the nation, the nation's schools are failing to create a 21st century workforce with skills needed in today's economy. California's Legislative Analyst reports that California ranks 31st in the nation in per-pupil spending and ranks almost last in student achievement.[5] According to the National Assessment of Educational Progress, one-third of fourth graders and one-quarter of eighth graders in the U.S. are functionally illiterate.

A December 2010 report by the Foundation for Excellence in Education, Digital Learning Now![6] states:

"*Technology has transformed the way we live, work and play. We can communicate across oceans and continents within seconds. We can bank, shop, and donate securely from the convenience of our homes or offices. We can work remotely, even in planes, without losing productivity and often increasing it. We can entertain ourselves with a plethora of books, videos and games – accessible at a moment's notice through the Internet.*

"Yet our school system remains, by and large, the same as it was fifty years ago. The overwhelming majority of students attend a brick-and-mortar school for a set number of hours on a set number of days based primarily on an agrarian calendar. Students sit at desks and consume content in textbooks that may already be outdated."

A recent report by Pew Research Center, Generations 2010[7] gives evidence that technology is invading the daily lives of Americans regardless of generational differences and these trends are increasing in our younger generations. According to the Pew Internet Project Survey conducted from April 29 to May 30, 2010, use of the Internet transcends all generations, with 79% of all American adults active Internet users. While most generations have Internet adoption rates of at least 70%, younger generations continue to be over-represented in online populations. The infographic (see below) provided by Pew Internet gives a generation-by-generation snapshot of predominant Internet Use.

[5] Cal Facts, Legislative Analyst, 2011
[6] Digital Learning Now!, December 1, 2010, Foundation for Excellence in Education.
[7] Generations 2010, Pew Internet, a Project of the Pew Research Center, http://pewinternet.org/Reports/2010/Generations-2010.aspx

Millennials Ages 18-33	Gen X Ages 34-45	Younger Boomers Ages 46-55	Older Boomers Ages 56-64	Silent Generation Ages 65-73	G.I. Generation Age 74+
Email	Email	Email	Email	Email	Email
Search	Search	Search	Search	Search	Search
Health info	Health info	Health info	Health info	Health info	Health info
Social network sites	Get news	Get news	Get news	Get news	Buy a product
Watch video	Govt website	Govt website	Govt website	Travel reservations	Get news
Get news	Travel reservations	Travel reservations	Buy a product	Buy a product	Travel reservations
Buy a product	Watch video	Buy a product	Travel reservations	Govt website	Govt website
IM	Buy a product	Watch video	Bank online	Watch video	Bank online
Listen to music	Social network sites	Bank online	Watch video	Financial info	Financial info
Travel reservations	Bank online	Social network sites	Social network sites	Bank online	Religious info
Online classifieds	Online classifieds	Online classifieds	Online classifieds	Rate things	Watch video
Bank online	Listen to music	Listen to music	Financial info	Social network sites	Play games
Govt website	IM	Financial info	Rate things	Online classifieds	Online classifieds
Play games	Play games	IM	Listen to music	IM	Social network sites
Read blogs	Financial info	Religious info	Religious info	Religious info	Rate things
Financial info	Religious info	Rate things	IM	Play games	Read blogs
Rate things	Read blogs	Read blogs	Play games	Listen to music	Donate to charity
Religious info	Rate things	Play games	Read blogs	Read blogs	Listen to music
Online auction	Online auction	Online auction	Online auction	Donate to charity	Podcasts
Podcasts	Donate to charity	Donate to charity	Donate to charity	Online auction	Online auction
Donate to charity	Podcasts	Podcasts	Podcasts	Podcasts	Blog
Blog	Blog	Blog	Blog	Blog	IM
Virtual worlds	Virtual worlds	Virtual worlds	Virtual worlds	Virtual worlds	Virtual worlds

Color Key

90-100%	80-89%	70-79%	60-69%	50-59%	40-49%	30-39%	20-29%	10-19%	0-9%

Percent of internet users in each generation who engage in this online activity

Source: Pew Internet Survey

The Digital Learning Now! report emphasizes the power of technology and scalability to customize education so that each and every student learns in his or her own style at his or her own pace. When checking current student achievement data in California and beyond, it becomes apparent that there is an urgent need to create new paradigms for our educational delivery systems.

The National Assessment for Educational Progress reports national and state scores In math and science. Among the top 30 industrialized countries, US high school students rank 21st in science and 25th in math.[8]

California's **math scores** indicate 28% of 4th graders had Below Basic scores as of 2009 compared to 19% for the nation; and 41% of 8th graders had Below Basic Scores compared to 29% for the nation[9].

California **science scores** indicate 50% of 4th graders had Below Basic scores as of 2005 compared to 34% for the nation, and 56% of 8th graders had Below Basic scores compared to 43% for the nation[10].

According to Digital Learning Now!, nearly one-third of students don't earn a high-school diploma. In 2009, more than 1.3 million U.S. students did not graduate high school. The *Digital Learning Now!* Report estimates an average of 7,200 students every day will drop out of school.

According to the Center for the Future of Teaching and Learning's (CFTL) 2009 report, *Teaching and California's Future,* "Nearly one in five students entering ninth grade do not graduate from high school, and the figures are far worse for African American and Latino students." The 2009 CFTL report notes, "By ethnicity, the dropout rate for students who began high school in 2004 was 33% for African Americans, 24% for Latinos, 12% for Whites, and 8% for Asians (Source: California Department of Education, 2009.)

An estimated $1 billion is spent nationally each year on college remediation –- knowledge students should have obtained in high school.

An important component of this report is to document various examples of productive uses of digitally enhanced education to improve student access and academic achievement with a goal of preparing a globally competitive workforce in the 21st century for the benefit of all Californians.

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[8] Digital Learning Now!, December 1, 2010, Foundation for Excellence in Education, p.4

[9] See: http://www.cde.ca.gov/ta/tg/nr/documents/naepgr4snapshot2.pdf) and http://www.cde.ca.gov/ta/tg/nr/documents/gr8math09snap.pdf

[10] See: http://nces.ed.gov/nationsreportcard/pdf/stt2005/2006467CA8.pdf and http://nces.ed.gov/nationsreportcard/pdf/stt2005/2006467CA4.pdf

IV. The Status of Digitally Enhanced Education in California

Several digital learning and educational technology policies and initiatives have been created in California. This brief white paper report does not claim to represent a complete list of all such California-based digital learning initiatives. The following is a list of representative programs and policies.

California Statewide Digitally Enhanced Education Programs:

- **The K-12 High Speed Network (K12 HSN)** (see http://www.k12hsn.org/about/) K12HSN is a state program funded by the California Department of Education and provides the State's K-12 community with:

    - Network Connectivity, Internet Services
    - Network Diagnostic Service
    - Teaching and Learning Application Coordination
    - Videoconferencing Coordination and Support

    This mission of K12HSN is to enable California educators, students and staff across the state to have access to a reliable high-speed network, thereby enabling the delivery of high quality online resources to support teaching and learning and promote academic achievement.

    K12HSN administers K-12 participation through the California Research and Education Network (CalREN). CalREN is the high speed, high-bandwidth statewide network of 14 Hub Sites and circuits linking to 73 K-12 Node Sites, 11 UC Node Sites, 24 CSU Node Sites, 111 community college Node Sites, as well as 6 Node Sites serving the three participating private universities. (CalREN is also linked to the national Internet 2 Network forming an advanced state and national "Intranet" for educational use.)

    Backbone services under K12HSN are provided by the Corporation for Educational Networking Initiatives in California (CENIC).
- **California Virtual Campus (CVC)**
  Created in 2008, the California Virtual Campus (CVC) is a one-stop portal for distance education in the state. CVC is tasked with providing complete, timely, and accurate information about online courses and programs in California higher education, as a guide to students as they navigate through the complex world of distance education in California. CVC also supports faculty members by partnering with K-12 schools, community colleges, CSU, UC and private universities to facilitate use of emerging educational technologies in the development of high-quality online courses, programs and services. The CVC maintains a priority for improving student academic performance in public schools through research-based innovations in teaching and learning. The enabling law sets definitions for online courses and online instruction. Online courses

refer to online teaching, learning, and research resources (e.g. books, course materials, video materials, interactive lessons.)

- **Online Charter Schools**
  Under California Department of Education rules, a virtual online charter school is one in which at least 80% of teaching and student interaction occurs via the Internet.[11] California has roughly 25 online charter schools and district programs, many of which are supplemental. As an example, the California Virtual Academies are a network of nine online charter schools affiliated with K12 Inc. Full-time online charter schools reported 10,502 K-12 enrollments in 2008-09.[12]
- **University of California College Prep (UCCP) On Line** (see www.uccp.org)
  The University of California College Preparation project publishes free college preparatory and AP curriculum to benefit California students, with an emphasis on assisting underserved students (including those in rural areas) to gain college eligibility. The curriculum is free to California schools, school districts and educational organizations.

  According to UC, nearly one million students in California attend schools that do not offer enough college prep or "a – g" courses for their students to prepare for college.

  Since 1999, thousands of students in underserved schools have completed UC AP and other "a – g" courses and have taken AP exams through the UCCP on line program.
- **California Technology Assistance Project**
  (http://www.myctap.org/index.php/home/about-ctap)
  The California Technology Assistance Project (CTAP) is a statewide technical assistance program, funded by the California Department of Education (CDE). Intended to promote effective use of technology in teaching, learning and school administration, CTAP provides assistance to schools and districts based on local needs in each of 11 regions in California. CTAP serves as a one-stop website for information about educational technology resources ranging from the latest research, promising practices and available support resources.

  According to the CTAP website, each region has developed and implemented a three-year plan to provide technology assistance in four key areas: a) Professional development and learning resources to use technology as a tool to improve teaching and learning; b) Professional development and support for hardware and telecommunications infrastructure design, implementation and sustainability; c) Professional development and support to use technology as a tool to improve school management, including pupil record-keeping and tracking for pupil instruction and data-driven decision making; d) Funding and coordination with other Federal, State and local programs.

[11] California Administrative Code Title 5, Sec. 11963.5.
[12] Keeping Pace with K-12 Online Learning, Page 63, Evergreen Education Group, www.kpk12.com

CTAP regions have also provided assistance to districts to develop technology plans that meet the State Board of Education guidelines so that they may apply for Federal funds available for technology as part of the No Child Left Behind legislation's Enhancing Education Through Technology (EETT) program.

- **Enhancing Education Through Technology (EETT)** (http://www2.ed.gov/programs/edtech/index.html)
  Enhancing Education Through Technology (EETT) is a federally funding program that has been the major federal funding source for a variety of programs related to K-12 educational technology for the past six years. EETT grant categories include:

  - **EETT Formula Grants (ESEA Title 2-d):** Allocated to school districts based on the Title I formula and the existence of an approved district educational technology plan. This fund category supports professional development, hardware and infrastructure.
  - **EETT Competitive Grants (ESEA Title 2-d):** Similar to the formula grants in purpose, this funding is allocated, on a competitive basis, to school districts with an approved educational technology plan.
  - **EETT/ARRA Competitive Grants:** A one-time grant program with funds recently allocated to districts that prepared winning grant applications. Focus of these grants is the use of technology to support use of technology-enhanced data management systems by educators to facilitate use of student data in academic and career planning for students in grades 7 – 12.

  The EETT authorizing legislation will sunset this year (2011) without specific legislation to replace it. The National Educational Technology Plan, developed in November 2010 by the US Department of Education[13], and the National Blueprint for Education strongly suggest that all funding for technology should be consolidated into other federal programs.

- **California Brokers of Expertise Project (See website: http://www.cde.ca.gov/eo/in/se/brokers.asp)**
  The California Brokers of Expertise (BOE) Project, sponsored by the California Department of Education, is a knowledge-management system designed to gather all available education research that meets high standards, expertly cull the data for meaningful trends, and develop usable strategies specific to implementing that research into the State's significantly diverse schools. BOE's vision is to create a vehicle to put high-quality, innovative standards and research-based materials and resources at the fingertips of educators. The tool will allow teachers, principals and eventually all education stakeholders to communicate, share and network with their peers. In addition, BOE offers a hands-on, off-line component, which may include facilitated workshops, on-site coaches or summer institutes.

[13] Transforming American Education, Learning Powered by Technology, US Department of Education, November 2010, http://www.ed.gov/technology/netp-2010

The primary goal of this project is to increase student achievement by improving instruction and support services in California Schools by providing resources and guidance to educators, counselors, parents and students on strategies such as multiple pathways to college and career. BOE will encourage educators to collaborate in developing curriculum that applies academic knowledge and skills to concrete, real-world problems.

A priority is given to educators serving students who are low income, minorities, immigrant, limited English-language proficient, and at imminent risk of dropping out of school.

The BOE Project is administered by the California K-12 High Speed Network and receives technical support from the Imperial County Office of Education.

Other Related Programs:

- **The Science, Technology, Engineering, Math (STEM) and Career Technical Education (CTE) Educator Credentialing Program**

  Established in 2010 by Chapter 2, Statutes of 2010 (SBX5 1 - Steinberg), this program is administered by the California Commission on Teacher Credentialing (CTC). Its purpose is to provide alternative routes to credentialing in accordance with guidelines for the federal Race to the Top Fund, authorized under the federal American Recovery and Reinvestment Act of 2009 (Public Law 111-5). SBX5 1 requires that, not later than June 1, 2010, the CTC, in consultation with the Committee on Accreditation, will develop a process for providing these Educator Credentialing programs through school districts, county offices of education, community-based organizations and nongovernmental organizations.

  According to the CTC, Chapter 2, Statutes of 2010 allows CTC to establish an alternative avenue for teacher credentialing programs in STEM and Career Technical Education (CTE) by allowing CTC to accredit (based on California's standards for accreditation) eligible community based organizations and nongovernmental organizations to provide those teacher credentialing programs upon CTC approval. CTC has also established a financial stability assessment tool to ensure the stability of these newly authorized entities. Universities, school districts and county offices of education are currently authorized to offer these programs.

  The CTC reports that as a result of the work of its Committee on Accreditation, CTC has identified an approach providing options and flexibility for new program providers. However, as of February 8, 2011, CTC reports there have been no applicants from community-based organizations or nongovernmental organizations who have as yet indicated interest in offering these credentialing programs**.** (For more information see: http://www.ctc.ca.gov/STEM-CTE/STEM-CTE.html)

V. State Policies Governing Digitally Enhanced Education

State Policy on Distance Learning

Enacted by the Legislature in 1991, the California Distance Learning Policy defines distance learning as "learning in which the instructor and student are in different locations and interact through the use of a computer and communications technology. The 1991 policy states that distance learning may include "video or audio instruction in which the primary means of communication between pupil and instructor is instructional television, video, telecourses or any other instruction that relies on the computer or communications technology.

Independent Study regulations for all non-classroom based instruction

(See: http://www.cde.ca.gov/sp/eo/is/legal.asp)
California Education Code Section 51745 requires that local educational agencies that claim apportionment for independent study must first adopt and implement specified written policies relating to independent study. The required written policies must be adopted in accordance with California Code of Regulations, Title 5, Section 11701.

Charter Schools

California has roughly 25 online charter schools and district programs, many of which are supplemental. As an example, the California Virtual Academies, a network of nine online charter schools affiliated with K12 Inc. Full-time online charter schools reported 10,502 K-12 enrollments in 2008-09.[14] Charter school laws, some of which are specific to online programs, contain regulations regarding circumstances under which charter schools can receive funding for non-classroom-based instruction. Specifically, SB 740, Chapter 892, Statutes of 2001, and Education Code Section 47612.5 prohibits charter schools from receiving any funding for non-classroom-based instruction unless the state Board of Education (SBE) determines its eligibility for funding. See http://www.cde.ca.gov/sp/cs/as/nclrbifunddet.asp and http://www.sandiego.edu/soles/documents/CEPALOnlineLearningLegislation020810.pdf

Title V, California Code of Regulations, Section 11960 states: The State Superintendent of Public Instruction shall proportionately reduce the amount of funding that would otherwise have been apportioned to a charter school on the basis of average daily attendance for a fiscal year, if school was actually taught in the charter school on fewer than 175 calendar days during that fiscal year. (See California State Board of Education Policy # 00-05, July 2000 regarding "Waiver Guidelines: Charter School Average Daily Attendance: Alternative Calculation Method. (See http://www.cde.ca.gov/sp/cs/as/nclrbifunddet.asp)

Note: For more information on Independent Study and Charter Schools contact Carol Abbot, Education Programs Consultant, CDE, 916-319-0943, cabbot@cde.ca.gov.

[14] Keeping Pace with K-12 Online Learning, Page 63, Evergreen Education Group, www.kpk12.com

Selected Sections of the California Education Code Pertaining to Relevant Aspects of Digitally Enhanced Education in California:[15]

- **California Attendance Accounting for Online Education**
  The California Education Code gives all school districts the authority to provide online classes. Online curriculum may be presented either in a classroom setting or through independent study. The appropriate method of attendance accounting for such classes is dependent upon the instructional setting utilized, not on the curriculum itself.
- **Online Education in a Classroom**
  Some schools provide an online curriculum in a classroom setting similar to all other class periods. In this case, subdivision (a) of *Education Code* Section 46300-46307.1 is the relevant code: "In computing average daily attendance of a school district or county office of education, there shall be included the attendance of pupils while engaged in educational activities required of those pupils under the immediate supervision and control of an employee of the district or county office who possessed a valid certification document, registered as required by law." Note that the code requires that students be under the "immediate supervision and control" of a certificated employee. In some online classes the certificated employee acts as a tutor or facilitator, rather than as an instructor. In this setting, a daily period attendance form identical to that used in the other class periods is the appropriate attendance accounting document.
- **Online Education Provided through Independent Study**
  Independent study is an alternative instructional strategy that may also be utilized to implement instruction through an online course. It is important to note that *Education Code* sections 51745-51749.3 provide that the apportionment credit for independent study is made on the basis of the student's "product" (study or academic work), assessed by a competent, certificated employee of the district. Districts that opt to use the independent study strategy are advised to familiarize themselves with the requirements for independent study. These requirements are complex and district compliance is rigorously audited in the annual audit required pursuant to *Education Code* Section 41010-41023.
- **Combining Classroom and Independent Study**
  Individual student's programs may consist of part classroom-based study and part independent study. *Education Code* sections 46110-46119 and 46140-46147 limit elementary and most secondary students to one day of apportionment credit in any calendar day. District procedures must prevent the claiming of any combination of classroom and independent study credits that would exceed one day of apportionment credit per day of instruction in the school's calendar. In addition, if the student is scheduled for at least the minimum day (in most instances, 240 instructional minutes) of classroom-based study or independent study, then the attendance accounting for apportionment purposes can be determined solely from that predominant instructional setting.

[15] Information provided by Santa Clara County Office of Education.

- **Provisions of SB 740 – Non-classroom-Based Instruction & Funding Determination**
  Enacted by Senate Bill 740 (*Education Code* Section 47612.5) prohibiting charter schools from receiving funding for non-classroom-based instruction unless the State Board of Education (SBE) determines its eligibility for funding.
- **Code of Regulations for Non-classroom-based Instruction**
  Regulations for non-classroom-based instruction funding determinations may be found in the *California Code of Regulations* (*CCR*). New regulations for non-classroom-based instruction funding determinations:
    - 5 *CCR* 11704 Pupil-Teacher Ratio
    - 5 *CCR* 11963 Definitions of Classroom-Based Instruction
    - 5 *CCR* 11963.1 Non-classroom-Based Instruction in Charter Schools
    - 5 *CCR* 11963.2 Average Daily Attendance for Non-classroom-Based Instruction in Charter Schools
    - 5 *CCR* 11963.3 Determination of Funding Request Forms and Calculations
    - 5 *CCR* 11963.4 Evaluation of Determination of Funding Requests Regarding Non-classroom-Based Instruction
    - 5 *CCR* 11963.5 Determination of Funding Requests for Non-classroom-based Virtual or Online Charter Schools
    - 5 *CCR* 11963.6 Submission & Action on Determination of Funding Requests Regarding Non-classroom-Based Instruction
    - 5 *CCR* 11963.7 Termination of a Determination of Funding Requests Regarding Non-classroom-Based Instruction

VI. Digital Education Models in California and Beyond

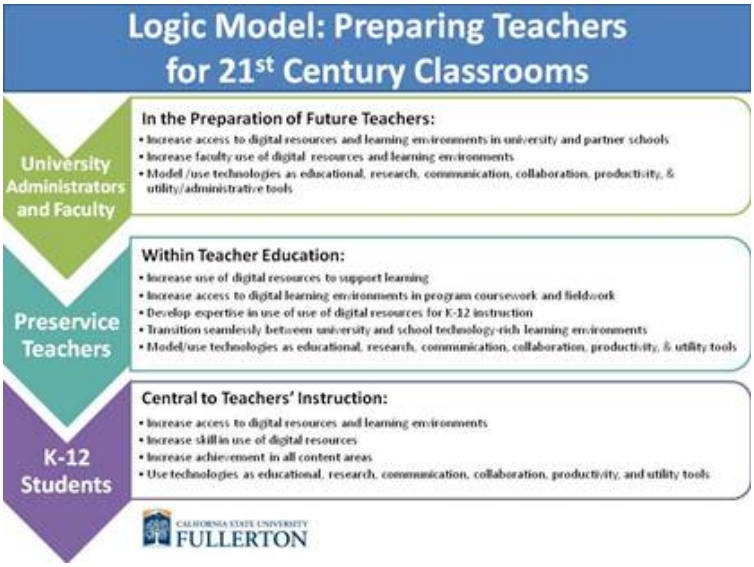
Cal State University, Monterey Bay: Leap Frogging Mathematics in The Early Start Program
Through a partnership with the HP Catalyst Initiative since 2003, CSU Monterey Bay has spearheaded the use of Tablet PC technology across the curriculum. One consistently successful project focuses on math remediation courses where faculty work with 500 students annually, most of whom are economically and educationally disadvantaged.

By integrating Tablet PCs in a revised curriculum, including new approaches to classroom management and collaborative learning activities, the students' passing rate in CSU Monterey Bay's remedial Math 98/99, a two-semester remedial math course, has been over 92% -- up from 72% pass rate since 2007.

The Leap Frogging Mathematics Program allows high school math teachers and students to attend math "boot camp" during the summer. The high school teachers will partner with CSUMB faculty members on new educational strategies using tablet PCs – personal computers equipped with touch screens – that address the needs of remedial math students. The Leap Frogging Mathematics program has recently earned an EdTech Innovators Award from Hewlett Packard and the New Media Consortium.

California State University, Fullerton: Single Subject Middle School Mathematics and Science Digital Credential Program Pathway (MS2DCP2) prepares future teachers through a hybrid model that leverages current technology to provide candidates with access to powerful instructional, research, communication, collaboration and productivity tools. Utilizing digital learning resources within their University coursework as well as applying these in their fieldwork, candidates develop understanding and skills in teaching science and mathematics with 21st century tools an media, such as "BrainPop," "Geogebra," and "The Jason Project." The program delivers significant portions of the credential program online, making it accessible across the State and facilitating teaching and learning at a broad range of places and times.

CSUF poses that the transformation of teacher preparation to prepare candidates for 21st century classrooms begins with addressing hardware, software, infrastructure and faculty training. The logic model that demonstrates how such efforts will positively impact K-12 STEM learning is represented in the following model:



Landmark Elementary School in Pajaro Valley Unified School District
Landmark Elementary School Principal Jennifer Wildman has a vision of purchasing small amounts of technology year after year with the hopes of becoming a model school for technology integration. The Principal and staff have found integrating Flip cameras have increased teacher effectiveness by providing teachers with videos in their classrooms which aids in the critical evaluation of various teaching methods used in the school. (Source: http://www.myctap.org/index.php/home/about-ctap)

Amelia Earhart Middle School, Riverside Unified School District
At Amelia Earhart Middle School, two classes of Algebra 1 students are now accessing textbooks on IPads through a partnership with the educational publisher Houghton Mifflin Harcourt. Riverside Unified School District was the first school system in the State to adopt and implement the use of digital textbooks , following then Governor Arnold Schwarzenegger's announcement of the Free Digital Textbook Initiative, launched in May 2009. The digital textbook initiative in the Riverside schools is one example of pockets of innovative digital textbook use in K-12 schools around the country.

California High School Exit Exam (CAHSEE) Stepping Into Your Future Project
(http://cahseesteps.net/) In April 2007, grant awards through the California Community College Chancellor's Office were made to two applicant community College Districts, including Butte-Glenn and Lake Tahoe CCD for purposes of assisting students failing to pass the California High School Exit Exam. Grant funds were used to provide an online English language arts and on online mathematics program to eighteen and nineteen year old students denied a high school diploma due to their need to pass the CHSEE. Two additional awards were made to the two colleges in subsequent years enabling the programs to operate for a total of two and one half years. The two college districts implemented the grant funded programs collaboratively with partners from K-12 and all three higher education segments. The CAHSEE Stepping Into the

Future program is now designed as a hybrid model offering online course content built within Moodle, an open source course management system. Pre and post assessments are also offered.

High Tech High (http://www.hightechhigh.org/about/)
High Tech High began in 2000 as a single charter high school launched by a coalition of San Diego business leaders and educators. It has evolved into an integrated network of schools spanning grades K-12, housing a comprehensive teacher certification program and a new, innovative Graduate School of Education.

High Tech High's mission is to develop and support innovative public schools where all students develop the academic, workplace and citizenship skills for postsecondary success. Currently High Tech High is comprised of nine schools, including three middle schools and one elementary school, serving 3,500 students and staffed by 350 employees. 100% of high school graduates have been accepted to college, 80% to four-year institutions.

Northwestern University iLab Project (http://www.osep.northwestern.edu/projects-and-programs/ilab-network) Northwestern University's iLab Project offers high school students remote access to some of the most advanced science laboratory equipment in the world – including instruments using output from nuclear reactors. The iLab Network, created through Northwestern's Office of STEM Education Partnerships, has received a two-year $1 million grant from the National Science Foundation. iLab is designed to help students in science proficiency through becoming engaged with science through remote access to world class science instrumentation. A series of remote laboratory experiments geared for high school students are being developed in partnership with MIT.

VII. Private Sector Leaders and State-of-the Art Digitally Enhanced Learning

There are many examples of new and emerging uses of digital technology to improve the delivery and framework for teaching and learning. Some examples include the following:

Hewlett Packard: HP Catalyst Initiative
http://www.hp.com/hpinfo/socialinnovation/catalyst.html
HP, through its HP Catalyst Initiative, is effectively identifying new models for STEM teaching and learning, through creation of five international consortia, each focusing on a specific innovation theme.

The **five innovation themes** are:

1) **The Multi-Versity (led by Sloan Consortium, USA)**
   Investigating new and best practices in online education for STEM students and professional development of faculty. This international consortia provides students with new learning opportunities from a variety of academic institutions that can be applied toward STEM degrees and certification.
2) **Pedagogy 3.0 (led by Futurelab, UK)**
   Creates new models of teach preparation designed to better equip teachers to facilitate 21st century learning experiences for students. Projects engage new teachers during their pre-service and induction years, plus in-service master teachers, teacher education faculty and engineering/science content experts and faculty.
3) **Global Collaboratory (led by CSIR Meraka Institute, South Africa)**
   Enables students to participate in collaborative problem-solving to address urgent social challenges using the power of collaborative grid computing. (This theme builds on the HP/UNESCO Brain Gain Initiative. (See: http://www.hp.com/hpinfo/socialinnovation/braingain.html)
4) **The New Learner – (led by Agastya International Foundation, India)**
   Engages a variety of educational institutions (formal and informal) as they mutually explore how to build a network of learning opportunities for students, with a goal of identifying new models of student-driven STEM + learning that lead to higher school completion rates, and promote "learning how to learn."
5) **Measuring Learning (led by Carnegie Mellon University (USA)**
   Develops and demonstrates new approaches for using technology to measure STEM + competencies that are often not assessed in a traditional school environment.

In an interview with Hewlett Packard Education Program Manager, Jim Vanides, it was noted that in 2010, 35 organizations were funded under the HP Catalyst Initiative organized based on the above five theme areas. The following are principles and goals of the Initiative:

- Combining best instruction models with best technology, i.e. "pedagogy plus technology."
- Infuse interactive technology tools into the learning design, resulting in increased

capacity for fast track formative assessment. Interactive tools such as tablet PC's, "clicker" technology, etc. enable the instructor to more rapidly identify student barriers to successful learning through conversation and problem solving. This result is also enhanced through use of open ended questions rather than multiple choice testing.

- Recognizing and achieving the "power of anonymity" through use of interactive learning allowing a student to be "wrong" in a less intimidating environment.
- Recognizing the importance of mobility. The HP Catalyst Initiative allows remote access to science, engineering and mathematics experts from around the globe as well as bringing into the classroom science experiences in other geographic locations, both foreign and domestic. (Example: Northwestern University is engaging a consortium of people to investigate remote access to science and technology laboratories.)

The 2011 solicitation for the HP Catalyst Initiative, to be released in March 2011, will fund additional global consortia for institutions serving students in grades 6 to 16. Eligible entities include school districts, county offices of education, public and private colleges and universities, including those in California.

IBM Digital Education Initiatives
http://www.ibm.com/smarterplanet/in/en/education_technology/ideas/index.html?re=spf
IBM notes the demand for knowledge workers with specialized skills is growing by 11% a year. Many jobs will require lifelong training and continuous updating of skills.

To address this need, IBM has developed several digital education initiatives including, but not limited to:

Australia Smart Education Wireless Services Contract with New South Wales Department of Education. IBM will implement wireless connectivity across 463 secondary schools under the Australian Federal Government's Digital Education Revolution Initiative. Under the contract, IBM will offer secure, scalable wireless connectivity at public secondary and central schools providing more than 200,000 students and about 25,000 teachers with enhanced opportunities for teaching and learning.

Smarter Planet Initiative. Under IBM's "smarter planet" initiative, IBM is collaborating with more than 250 universities in 50 countries that are offering degrees in Service Science, Management and Engineering (SSME). This new academic discipline combines technology and business skills and focuses on complex service systems, such as healthcare and transportation networks.

Intel Education Programs
http://www.intel.com/about/corporateresponsibility/education/programs/index.htm
Intel is among private sector innovators enabling the adoption, by K-12 schools and higher education institutions, of emerging digital learning strategies and tools.

Intel's "Intel Education" program enables 21st century teaching and learning through free

professional development, tools and resources. *Intel Education* includes assessment of 21st century skills and core content to help students think at higher levels and become self- directed learners.

The "Intel Teach" program assists teachers to become more effective educators by integrating technology into their lessons – promoting problem solving, critical thinking, and collaboration skills among their students. With more than 9 million teachers trained in over 60 countries, "Intel Teach" is the largest, most successful program of its kind.

The "Intel Higher Education Program" encourages students to pursue technical degrees to help move technology from university labs into local communities. The program supports innovative technology curricula, advanced research with other universities, entrepreneurship programs, and student centered programs.

Apple Inc.'s Distinguished Educator Program
http://www.apple.com/education/apple-distinguished-educator/
Apple 's *Distinguished Educator Program* was created to recognize K-12 and higher education pioneers who are using a variety of Apple products to transform teaching and learning. This program has grown into a worldwide community of visionary educators and innovative leaders demonstrating innovative methods for integrating technology into K-12 and higher education learning environments.
Karen Cator, Apple Inc.'s former director of education leadership and advocacy who oversaw Apple's *Distinguished Educator Program*, professional development initiatives and teacher and learning content on the former *Apple Learning Exchange*, was appointed on November 9, 2009 to head the US Department of Education's Office of Educational Technology.

Google, Inc.
Breakthrough Learning In a Digital Age Forum
http://www.google.com/events/digitalage/faq.html
On October 27 and 28, 2009, Google Inc. hosted a Breakthrough Learning in a Digital Age Forum at its Mountain View headquarters. In cooperation with forum founders Joan Ganz Cooney Center at Sesame Workshop, Common Sense Media and John D. and Catherine T. MacArthur Foundation, the Forum was designed to establish specific ways to dramatically improve student literacy and higher level skills.

Bharti Foundation, India and Google, Inc. partnership promoting rural education in India.
http://www.deccanherald.com/content/133502/bharti-google-join-hands-promote.html
On January 31, 2011, the *Deccan Herald* announced that Bharti Foundation, the philanthropic arm of Bharti Enterprises in India has received $5 million in funding from Google, Inc. to upgrade and support 50 Satya Bharti elementary schools run by Bharti Foundation with a goal of promoting education in rural India.

Wolfram Mathematica
http://www.wolfram.com/mathematica/

Mathematica is renowned as the world's leading application for computations. In addition, Mathematica is the only development platform fully integrating computation into complete workflows; moving students from initial ideas to deployed individual or enterprise solutions.

Mathematica is an aid to students enrolled in a variety of coursework, such as math, science, engineering and other subjects. Hundreds of thousands of students rely on Mathematica to complete homework faster, increase their understanding of concepts and present work professionally.

Cisco Learning Network
https://learningnetwork.cisco.com/docs/DOC-10424
Cisco operates the Cisco Learning Network (CLN). CLN provides Cisco certifications in such topics as network design, routing and switching, security, SP Operations, voice and wireless. Cisco recently announced a new Network Security Certification Program: Cisco Certified Network Professional Security (CCNP Security). This new certification program is for Cisco Network Security Engineers who are responsible for testing, deploying, configuring and troubleshooting the core technologies comprising the Cisco secure network. Cisco's Certification categories include: 1) Entry; 2) Associate; 3) Professional; 4) Expert; 5) Architect and 6) Specialist.

Dell's Connected Classroom
http://dell.triaddigital.com/ConnectedClassroom/DigitalContent/
Dell's Connected Classroom (DCC) is a learning environment assisting students through use of innovative educational technologies. The DCC extends learning beyond the classroom allowing collaboration with other students and access to digital educational content and tools. Dell's Connected Classroom also features a Professional Learning component working with District personnel to provide a comprehensive professional development plan through one-on-one instruction for teachers and district personnel. Dell's Connected Classroom Content Partners features "Brain Honey", a web based learning platform for K-12 schools helping educators accomplish individualized data standards and data driven learning both in the classroom and on-line. On September 22, 2010, Dell announced a commitment to give $10 million in cash and Dell technology to support education technology initiatives in 2011 in connection with the United Nations Private Sector Forum on the Millennium Development Goals. More than 70% of Dell's contributions will aid young people in underserved communities outside the United States.

Mind Research Institute
http://mindresearch.net/
The MIND Research Institute is a non-profit corporation dedicated to neuroscience and education research located in Costa Mesa, California. Born out of decades of breakthrough neuroscience and education research, MIND's Education Division deploys its distinctive visual approach through innovative instructional software, textbooks, and professional development for the K-12 math market.

MIND's unique math education process engages the spatial temporal reasoning abilities of the learner to explain, understand and solve multi-step problems. The Math Initiative Program is a community partnership to help schools and teachers elevate student math skills through utilization of the MIND Research Institute's ST Math Program. MIND's Algebra Readiness Program is a full curriculum building a solid math foundation for middle and high school students to prepare them for success in Algebra I.

The Mind Research Institute enables elementary and secondary students to reach their full academic and career potential through developing and deploying math instructional software and systems. MIND also conducts basic neuroscientific mathematics, and education research to improve math education and advance scientific understanding.

VIII. Teacher Perspectives: Digital Education in the Classroom

Members of the California Teacher Advisory Council (Cal TAC), an advisory group to the California Council on Science and Technology, were informally surveyed regarding their professional development opportunities and experiences related to digitally enhanced education. The following is a summary of responses from this survey[16].

Experience in Teacher Preparation

Of the responses received to this question, one teacher received no professional development on digital learning processes and tools as part of teacher credentialing program.

Other respondents indicated they had some professional development in digital learning that was embedded in core coursework, rather than a stand-alone curriculum; or they received some limited computer coursework required for credentialing.

One respondent indicated most of credential program related training was on software, i.e. to make math classes more engaging, using tools such as Excel, Texas Instrument products, Geometer's Sketchpad, etc. No exposure given to on-line learning, though 10 years ago. It was suggested that a follow up survey be undertaken of a cross-section of academic institutions granting credentials for more accurate data.

Professional Development Experiences

Highlights of responses received:

- Most respondents indicated they had taken professional development coursework. A variety of providers of those courses were reported, including:
    - Offered at school site;
    - Offered by CTAP region;
    - Attended professional development workshops
    - Enrolled in online coursework (i.e. on how to use iPhoto, iMovie, iDVD, podcasting, etc.
    - Attended CUE (Computer Using Educators) conferences.
- Other respondents reported working independently to develop proficiency in various tools and training modalities; i.e. becoming proficient in a range of TI handhelds; Vernier data collection tools; Interwrite boards; wireless pads; Wolfram Alpha, etc.
- One educator reported his district has created a Professional Development Center focusing on the "what" and "why" of digital learning. A partnership with Lawrence Livermore National Laboratory has also been forged to create curriculum and teacher training on computer visualization and simulation.

[16] It is important to note, however, that it was outside the scope of this paper to examine teacher preparation programs. One example of digitally enhanced education, at California State University Fullerton (cited on page 17) is illustrative of the kind of innovation that is currently in place. As suggested by a respondent below, a follow-up survey would be needed to describe the range of digitally enhanced education within teacher credential programs in California in order to provide accurate and current data on this topic.

Larger Issues

Cal TAC survey respondents reported several issues for further discussion:

- At school district there was a "buy the stuff" mentality, but not much attention to the roll out and support for use of the tools.
- Conversations regarding digital learning often revolve around "stuff" like computer, iPADS, digital whiteboards, student response systems (i.e. clickers), and probeware. Any changes we bring to education should be about students and their learning; not about "stuff."
- The past two decades have seen schools bring in a great deal of technology without really changing the way we teach students. In many cases, technology has been used to "substitute" for older technologies – like moving from chalkboards to overhead projectors to Power Point.
- For technology to truly transform learning, it needs to "modify" or "redesign" student learning experiences.
- Our students live in an ever-flattening world, with tools having potential to engage and deepen their learning experience.

One respondent reported his school has identified four technological avenues for transforming learning:

- Computer visualization and simulation
- Educational gaming
- Social Networking
- Digital Storytelling

The respondent further noted his school has created a Professional Development Center focusing on both the "what" and "why" of digital learning. A partnership with Lawrence Livermore National Lab has been established to create curriculum and teacher training on computer visualization and simulation.

School Administrator Perspectives: Digital Education as a 21st Century Learning Modality

The California County Superintendents Educational Services Association (CCSESA) provides an organizational mechanism for the 58 county superintendents of schools. The CCSESA organization has established a priority for facilitating expansion of digitally enhanced education and is currently writing an eLearning Framework for use by districts and county offices.

Interviews with a sampling of school administrators identify policy issues to be addressed to allow expanded use of digitally enhanced education in California schools. Some of these priority issues include:

- Funding formulas based on seat time (are a disincentive for online education

modalities).

- Lack of leadership at the state level
- Lack of an online learning framework
- Lack of legislation to support a coordinated informed effort

IX. Public Private Partnerships and Opportunities

Examples throughout this White Paper have been given of innovative digital education and online learning initiatives that have been launched in the current decade by the private sector and academia. Opportunities exist to identify new partnerships with private sector innovation leaders, federal laboratories and academic experts to assist the State in developing a strategic plan for digitally enhanced education in the State that deploys the latest advancements in state-of-the-art digitally based innovations and tools to facilitate world class education in California.

X. Barriers and Moving Forward Options

Identified Barriers to Achieving Broad Infusion of Digitally Designed Education in California:

- The University of California does not have a clear policy regarding eligibility of "a – g" coursework delivered online to be recognized as meeting UC requirements. Action: UC
- Need to reconsider using "seat time" as a sole measure for drawing down a.d.a. attendance reimbursement to schools and districts in California. Action: State
- Need to explore access to science laboratories through on-line modalities as enhancements to "brick and mortar" curriculum enhancements. (See reference to Northwestern University's iLab Project) (See Section 7, page 19). Action: Innovation Action Team
- Need to identify new strategies to address access gaps to digitally enhanced education that remain in some regions of the state for disadvantaged students and rural areas. Action: Innovation Action Team
- Internet Speed: According to "Speed Matters," a project of the Communications Workers of America, 46% of California households have internet speeds that are below minimum national standards. (see: http://www.speedmatters.org/content/states/category/california). In an international comparison of Internet speed, the United States ranks 25th in the world with a 3.0 megabits per second speed, compared to South Korea (first place at 34.1 megabits per second); and Japan (tenth place at 18 megabits per second.) In a national comparison, California ranks 13th in the nation on a measure of Internet speed. Action: Public/Private Consortium

According to information provided by the Santa Clara County Office of Education, 26 of the 33 school districts access the Internet through the Santa Clara County Office of Education. Schools within each district connect to the District office. Bandwidth is not a major issue and Internet speeds are generally not a limiting factor as they are in a household environment. Santa Clara County Office of Education points out that in the case of a single point of Internet failure, the County office is working to build a multi-point solution so that if one connection is down, other options will be available. Another key issue is "denial of service attacks." It was noted these attacks are infrequent and when they occur, the County Office works with upstream Internet Service Providers to respond and identify the source of a "denial of service attack." It was

noted that additional research would be welcomed regarding this issue and the identification of strategies to increase network security.

Moving Forward Options

The following is a list of potential moving forward options either suggested in the above text or suggested in recent publications and reports on identified challenges to be addressed to enable expanded deployment of digitally enhanced education in California:

- Recognize and publicly articulate the convergence of focus at the state and national level on the need for expanded use of digitally enhanced education to address issues such as declining student achievement; increasing global competition and 21st century workforce development needs to support creativity and innovation in California. (Sample References: National Education Technology Plan 2010, US Department of Education and CCST Innovate to Innovation (i2i) report, February 2011.)
- Engage State leadership, including the California Department of Education, the Commission on Teacher Credentialing, the State Board of Education, the University of California, the California State University and California Community Colleges to review all pertinent California Education Codes, regulations, and administrative requirements for purposes of identifying impediments to the integration of digitally enhanced education in the State. (See Section 6 of this document for an initial list of laws, regulations and administrative requirements governing digitally enhanced education and online learning.) Action: State Legislature.
- Identify available federal, private sector and other non-state funding for the University of California and the California State University system for teacher preparation to increase full-time equivalence in teacher preparation programs, and link this funding to redesigned credentialing and professional development programs offering the set of skills needed for teachers and administrators to succeed in schools that are transforming instruction through use of digital education technologies, networks and tools.
- Champion a state-level convening of a Technical Experts Advisory Group on Digitally Enhanced Education to identify new and emerging technologies, develop a credible common definition of digitally enhanced education reflecting state-of-the-art technologies as a basis for development of a state plan for digitally enhanced education in the State. Action: Governor

The Technical Experts Advisory Group may be comprised entities including, but not limited to, the following:

- Private-sector innovators (i.e. Hewlett Packard, IBM, Intel and others);
- Federal laboratories
- Academic institution experts in networking, information technology, curriculum development, neurosciences, etc.
- Leading computer-using educators in California

List of Experts Consulted

1) **Carol Abbott**
   Education Programs Consultant
   Educational Options Office
   California Department of Education

2) **Phil Benfield**
   Network Engineer
   Santa Clara County Office of Education

3) **Dr. Joan S. Bissell**
   Director of Teacher Education and Public School Programs, California State University

4) **Craig Blackburn**
   Director of Educational Technology
   Santa Clara County Office of Education

5) **Barbara O'Connor,Ph.D**
   Professor Emeritus, Communications Division, and Director of the Institute for the Study of Politics and Media, CSUS
   Current Member, AARP National Board of Directors 2010-2016

6) **Victoria B. Costa, Ph.D.**
   Director, Science Education
   California State University Fullerton

7) **Stephanie Couch**
   California STEM Learning Network

8) **Mark Ellis**
   Associate Professor and Chair, Secondary Education
   California State University Fullerton

9) **Marilyn Errett, Ed.D.**
   Office of Governmental Relations
   California Commission on Teacher Credentialing

10) **Hongde Hu, Ph.D.**
    Math Department Chair
    California State University-Monterey Bay

11) **Mary Jones, Ph.D.**
    Education Programs Consultant – Retired Annuitant
    High School Transformation Office
    The California Department of Education

12) **Kelly Schwirzke**
    Coordinator, Online Learning, Region V
    Santa Clara County Office of Education

13) **Kristen Shand**
    Assistant Professor and Director of Admission Secondary Education
    California State University Fullerton

14) **Theresa Rouse**
    Associate Superintendent for Educational Services
    Santa Cruz County Office of Education

15) **Jim Vanides, M.Ed, BSME**
    Global Education Programs
    Office of Global Social Innovation
    Hewlett Packard Company