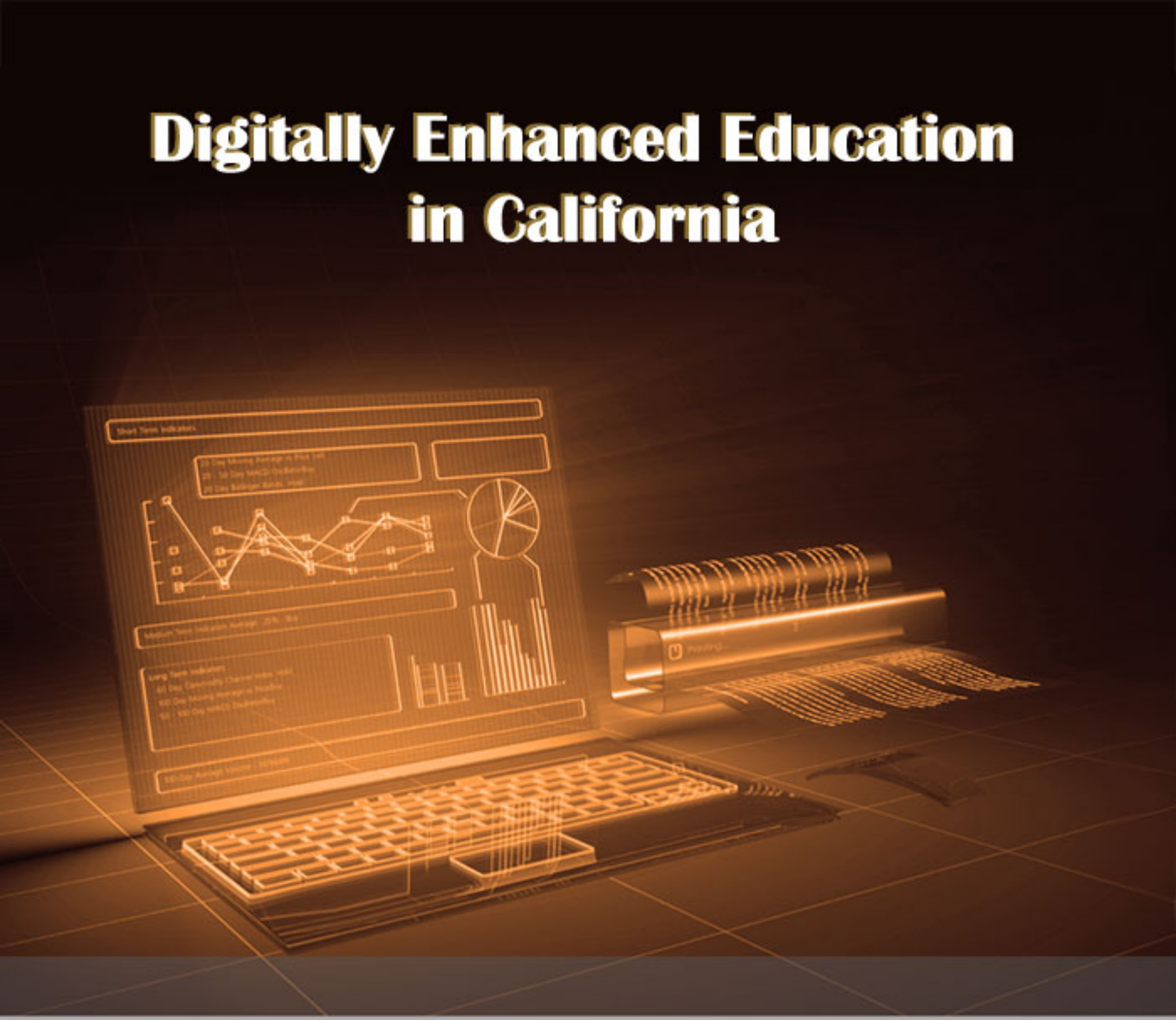
Digitally Enhanced Education in California



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Introduction

The incorporation of new technologies into education is a process that has been ongoing since the inception of the twentieth century. However the significant advances in information technology over the past twenty years have led to the realization that the education system – and the students it serves - will benefit more substantially if educators develop a more informed, focused and deliberate strategy for the adoption and use of technology-based education.

Digitally enhanced education is a broad term related to the use of technology in education, including everything from instructional materials (computers or other electronic devices in the classroom) to the use of online resources (digital libraries, virtual classrooms, etc.) In 2011, CCST published a white paper on digitally enhanced education in California[1] in preparation for a summit convened by the California Teacher Advisory Council[2] as part of CCST's Innovate to Innovation, a multi-faceted project intended to assess key aspects of California's innovation 'ecosystem'; digitally enhanced education was identified as one of three primary areas where CCST would focus. The paper defined terms for digital education, provided an overview of why digitally enhanced education should be a priority for California, and outlined existing programs and policies pertaining to digital education.

Innovate to Innovation

In 2010 CCST received a request from a bi-partisan group of California Legislators, which asked CCST to assess the state's innovation 'ecosystem' and offer a specific list of recommendations for legislators to enhance the state's ability to foster and benefit from innovation. To prepare its response to the Legislators' request, CCST convened a series of roundtables with academic, industry and research leaders across the state in late 2010 to seek their input on the challenges faced by California and possible solutions that could be achieved by building from California's S&T capacity. The leaders at these meetings identified education as one of the two major challenges California needed to address urgently.[3]

A follow up report from CCST in June focusing on digitally enhanced education explored the importance of improving the digital education climate in further depth, noting that:

> "A fundamental premise for this i2i report… is an acceptance that the digital age has particularly far-reaching implications for education, and that California needs to implement a 21st century learning environment that reflects the ubiquitous presence of technology and fully utilizes the tools, competencies, and innovation that have become part and parcel of daily life. Transforming California's 20th century education system into a 21st century learning environment is not just a question of following cultural

[1] CCST, Digitally Enhanced Education in California (March 2011), http://ccst.us/publications/2011/2011digital.pdf.
[2] For a summary of the meeting, which took place on 3/25/11, see Imagining the Future: Digitally Enhanced Education in California (http://ccst.us/publications/2011/2011digitalsummit.pdf)
[3] California Council on Science and Technology, Innovate 2 Innovation: An Assessment of California's Innovation Ecosystem – Phase I. (January, 2011)

trends, but rather a matter of ensuring sustainable economic development in California and enhancing our global security."[4]

The report proposed that California's 21st century learning environment be grounded in digital learning, transforming schools into "incubators of learning and innovation" that rest on four pillars (Table 2).

1: Classroom Environment	2: Teachers	3: Institutional Infrastructure	4: Partnerships
California must redefine the classroom as a mobile learning environment (access any time, any place) in which students have an active role in their learning experience, resulting in more student engagement.	California must foster an innovative learning environment where teachers are working alongside instead of in front of their students in a collaborative environment, with more opportunities for students to work at their own pace.	California must ensure that the infrastructure in these learning environments keeps pace with the digital world by ensuring that students and teachers have ready access to digital learning tools and policies that support their use.	California must encourage and enhance public-private partnerships, since they are a critical component for the development and sustainability of the envisioned 21st century learning ecosystems.

Table 2: The four pillars of a 21st digitally enhanced education. Source: CCST, 2011.

These pillars represent essential elements of the total digital education landscape. Each of them has been addressed individually at least in part, but they have not so far been promoted as an integrated strategy.

The current project is an update to the 2011 paper and is being prepared in two sections. This document examines digital education programs in California and related policy discussions and assessments released during the previous year. A companion document will focus exclusively on California education codes pertaining to digitally enhanced education.

[4] California Council on Science and Technology, Digitally Enhanced Education: Innovation for our Ultimate Resource – People. (June, 2011) p. 3.

Key Recommendations

Digitally enhanced education must be considered a core component of the education system, not a supplement to it.

The specifics of the hardware and software may evolve, but online education represents a true paradigm shift, rather than a trend. This shift needs to be reflected in:

- Definitions in the education code
- Funding allotments (following the student, rather than the school)
- School structures (i.e., eliminating the contiguous county rule)
- Teacher training and professional development (digital literacy needs to be a core competency, not an optional skill set)

Robust and comprehensive data collection and sharing must be a priority.

The lack of data on the quality of virtual schools and the numbers of students enrolled in them is a national, not California-centric, problem. However the state has an inconsistent record of data collection, and its current policies governing nonclassroom-based instruction – including the very definitions of the programs - are confusing and conflicting, adding to the difficulty. In order to effectively integrate online options into its education system, California needs to track:

- How many virtual and blended schools exist in the state
- How many students enroll in online courses (full and part time) as well as companion demographics such as SES, language, race, etc. The same data patterns employed under the CALTIDES and CALPADS should apply to on-line courses and instructors so adequate comparisons can be made.
- Student completion rates for online courses, as well as high school and college
- Providers of online education, both overall (e.g. vendors such as K-12) and individual (e.g., lecturers/teachers who contribute asynchronous content)

Public-private partnerships must be a core element of successful implementation.

Online learning is connected learning. California needs a policy framework that encourages public/private cooperation and allows for scaling up successful models and sharing resources. This may include partnerships with systems in other states.

I. Defining Digital Education

In the broadest sense of the term, "digitally enhanced education" or "digital education" is defined as any type of education that is facilitated by technology. This technically includes any incorporation of computer hardware and/or software into a learning environment, typically in the classroom. However in the context of most discussions about digitally enhanced education, the term is often treated as synonymous with "online learning", that is, instruction that involves internet-based educational delivery systems. The fact that most new technologies intended for educational use leverage online connections in some way, whether via an active exchange of information with peers or instructors, or simply uploading/downloading updates, further blurs the issue. For practical purposes, it is the online learning systems that offer the most significant potential for paradigm shifts in educational practice, as these systems are capable of connecting students with a vast range of coursework and instruction, as well as a highly personalized learning experience that proceeds at a pace determined by the student.

The Foundation for Excellence in Education, inventoried and clarified the following digital learning terms in 2010.

- Online Learning
- Synchronous
- Asynchronous
- Social Learning
- Virtual Classroom
- State Virtual School
- Blended Learning

The inter-institutional Digital Learning Council, launched by the Foundation for Excellence in Education, inventoried and clarified digital learning terms in 2010[5] as part of its effort to constructively advance the national dialogue on digital education. Of these, most terms are subcategories of **online learning** – instruction via "web-based educational delivery systems that include software to provide a structured learning environment." Online learning may involve **synchronous** (real-time) or **asynchronous** (previously recorded or static text) communication, which is sometimes provided in a structured format by an instructor, and sometimes involves **social learning** exchanges involving content sharing among groups. Synchronous learning may be structured in the form of a **virtual classroom**, which is essentially a traditional classroom format in which participants are interacting remotely. Both synchronous and asynchronous online learning may be used in a **state virtual school**, which is a formal educational institution, structure, or pathway that has been created or supported by state government as an alternative, in whole or in part, to the traditional educational pathway. **Blended learning** describes an approach that combines online learning with a traditional onsite education program.

Most schools have made at least some attempt to incorporate digitally enhanced education into their operations.[6] However, methods for doing so vary widely across states (and within states) depending on resource availability and the maturity and coherence of the state's overall vision. Typically, schools simply use technology to automate and support existing practices, rather than to transform the learning process. One widely cited assessment, the Digital

[5] Foundation for Excellence in Education, Digital Learning Now! (December 1, 2010).
[6] Pew Research Center, The Digital Revolution and Higher Education. (August 28, 2011).

Learning Now! (DLN) project, identified ten elements of high quality digital learning. These elements form the core basis of its annual "Digital Learning Report Card", an assessment of 72 specific metrics judged important to successfully transitioning to a digitally enhanced education system. The ten elements are:[7]

1. **Student eligibility:** All students are digital learners
2. **Student access:** All students have access to high quality digital courses
3. **Personalized learning:** All students can customize their content through an approved provider
4. **Advancement:** Students progress based on demonstrated competency
5. **Content:** Digital content, instructional materials, and online and blended learning courses are high quality
6. **Instruction:** Digital instruction and teachers are high quality
7. **Providers:** All students have access to multiple high quality providers
8. **Assessment and accountability**: Student learning is the metric for evaluating the quality of content and instruction
9. **Funding**: Creates incentives for performance, options, and innovation
10. **Delivery**: Infrastructure supports digital learning

Although not the only assessment, the DLN list has been specifically cited in online learning related laws passed during 2011 by various states, and at least some of the elements are addressed in all new online learning related legislation.

There have been a variety of approaches used for establishing a valid framework for digitally enhanced education policies. Other attempts to establish benchmarks for digital education readiness include an annual survey by the Software and Industry Information Association, which surveys K-20 educational practitioners and administrators on progress towards five key goals. SIIA's goals include:[8]

1. Adequate infrastructure providing 21st Century educational tools
2. Anytime/anywhere access for students
3. Differentiated learning (e.g., customizable learning experiences)
4. Assessment tools
5. Enterprise support (e.g., public/private partnerships)

As with DLN, universal student access, the ability to personalize the learning experience, and an outcomes-based emphasis on accountability are central. These three points, in fact, represent the unique core strengths that online learning systems have to offer.

In November 2011, DLN released report cards for all 50 states, assessing how well each had progressed towards meeting its ten elements (subdivided into a total of 72 specific metrics).

[7] Digital Learning Now!, p. 6.
[8] Software & Information Industry Association, 2011 SIIA Vision K-20 Survey Results. (August 10, 2011)

The highest score achieved by any state was 49. California, with only 14 metrics achieved, received the lowest score of any state. (See Figure 1.)

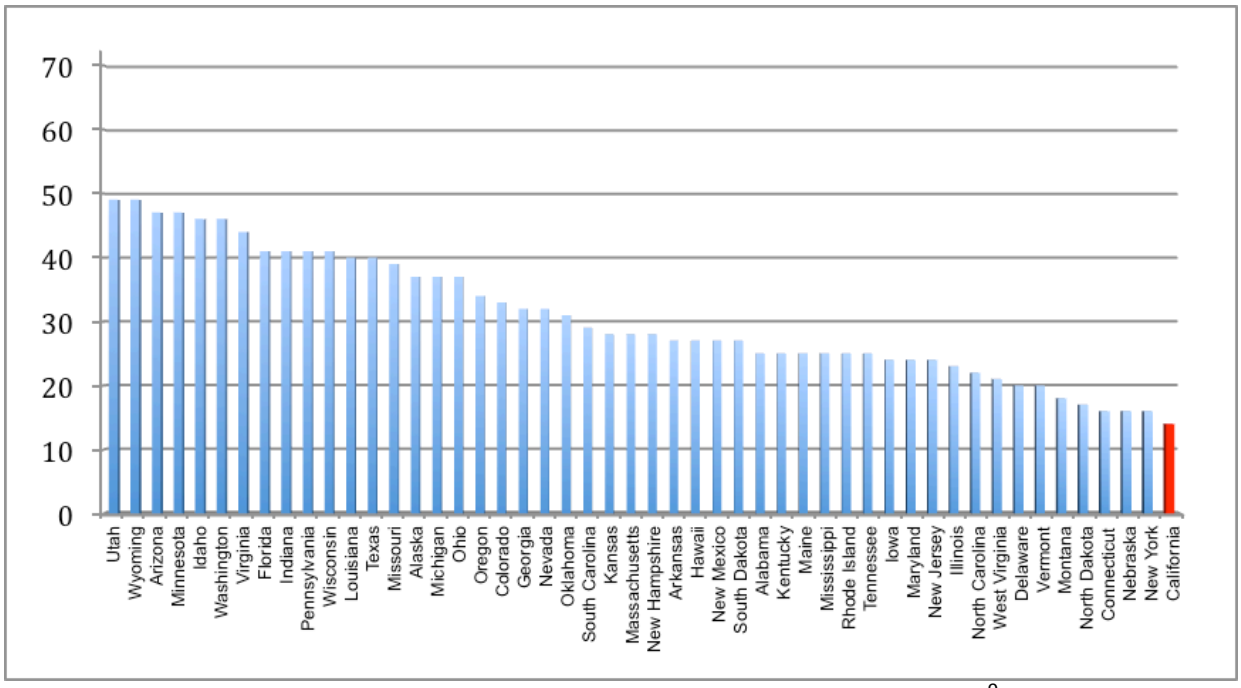

Figure 1. Digital Learning Now state rankings, November 2011.[9]

California did not achieve any metrics whatsoever in three of the ten elements: advancement according to demonstrated competency, quality control for instruction, and delivery infrastructure.

This assessment does not indicate that California has no activity in these areas, or in the ten core elements. In point of fact, as DLN notes, California has extensive online and blended learning activity, including extensive activity at a local level. The state has over 70 online charter schools and district online programs, and at least 15,000 students enrolled in full-time online charter schools.[10] However, these numbers need to be viewed in the context of the state's educational system – the nation's largest. Proportionally, California's 15,000 online students comprise only 0.25% of its overall student body, a percentage which ranks 18th out of 25 states offering full-time online charter school options.

In several cases, DLN did note that California had partially fulfilled the conditions for a metric. For example, metrics 19 through 25 concern the availability of online courses to all full and part time students at the elementary, middle school, and high school level. In each case, California has online courses available to some, but not all, students, so DLN marked these metrics as incomplete. However, these goals could in principle be accomplished given enough time and

[9] http://digitallearningnow.com/nations-report-card/, accessed February 15, 2012.
[10] Evergreen Education Group, Keeping Pace with K-12 Online Learning 2011, p. 73.

resources. In other cases, the data simply are not available to assess California's situation – there is no comprehensive list of online schools in the state, for example.

In other cases, the metrics used by DLN appear to be in direct conflict with California policy and are unlikely to be achieved without modification of the California Education Code. (See Table 1 below.)

Digital Learning Now! Goal	**California Policy**
(3) Under state law, private school students are eligible for publicly-funded digital learning.	In California, private schools operate outside and independent of the public school system. Also, Article IX, section 8, of the California Constitution prohibits public money from being appropriated for the support of "… any sectarian or denomination school, or any school not under the exclusive control of the officers of the public schools."
(9) Under state law, class size restrictions and/or teacher-student ratios for traditional classrooms do not apply to virtual schools (full-time).	California limits class size for kindergarten through 8th grade per California Education Code sections 41376 and 41378, enacted in 1964.
(10) Under state law, class size restrictions and/or teacher-student ratios for traditional classrooms do not apply to individual online courses (part-time).	
(11) Under state law, class size restrictions and/or teacher-student ratios for traditional classrooms do not apply to blended brick-and-mortar schools.	
(17) State law does not limit enrollment in virtual schools and individual online courses to district boundaries.	California only allows students to enroll in virtual schools that are available in counties geographically adjacent to their school district.
(18) State law does not limit enrollment in virtual charter schools to the country of charter.	
(27) Under state law, students may enroll with more than one individual online course provider.	California requires students to enroll with a single school district or charter school.
(34) State law does not require students to complete a defined amount of instructional time of instructional time to earn a credit. Students earn credits based on completion or competency.	California requires students to complete a minimum day each day, and the yearly number of instructional days.

Table 1: Conflicts between Digital Learning Now! Metrics and California Education Code[11]

The average score for all 50 states was 30.6. Average scores for the ten most populous states were not much different (30.3), suggesting that California's relatively low performance is not strictly due to a question of scale. However, average scores for the ten states with the highest percentage of high-technology businesses[12] were also comparable (30.8), suggesting that preparation for digitally enhanced education is not synonymous with a strong high-tech sector.

[11] Adapted from Digital Learning Now! California report card, November 2011

[12] National Science Board, Science and Engineering Indicators 2012 (January 2012), Table 8-52.

II. What Works and What Doesn't

There is still much under discussion regarding what works best in providing digitally enhanced education. The use of technology in the classroom has a positive effect on student outcomes overall: this much has been established through hundreds of studies over the past four decades.[13] However, a majority of these studies predate the existence of online learning, which offers a potentially much more significant transformation to the pedagogical landscape. Unfortunately, empirical research about the impact of academic achievement of K-12 students remains sparse.[14] A 2009 analysis of over fifty studies comparing online learning with traditional learning did find somewhat stronger student achievement among students who participated in online courses, although the authors cautioned that most of the studies focused on postsecondary students, and the level of participation varied among and sometimes within studies from a few courses to full-time enrollment in an online school.[15]

The promise of digital education is twofold: the potential both to improve student outcomes and to lower costs. Principals and district administrators perceive online learning opportunities as valuable for keeping students engaged, increasing graduation rates and offering academic remediation, and providing scheduling alternatives.[16]

There are examples of programs in California where digitally enhanced education has demonstrably improved student performance. An important common factor among these programs is their ability to adapt to individual student needs on a continuous basis.

Digital Education by Stages

The incorporation of digital learning technologies into the education process has been highly fragmented and at times ad hoc. Student outcomes can be enhanced in a variety of ways, some involving more radical disruption to the traditional instructional model than others.

In the least disruptive approach, a technology is introduced as a new pedagogical tool for a particular subject and is used during normal class time along with traditional instruction. One example is the Spatial-Temporal Math (ST Math) programs produced by the nonprofit MIND Research Institute (MRI)[17], which conducts research on learning and the brain and applies this research to the development of K-12 education programs. ST Math collects information on virtually every keystroke the students make, information that is used both by the program and

[13] Tamim, Rana M. et al. "What Forty Years of Research Says About the Impact of Technology on Learning: A Second-order Meta-Analysis and Validation Study." Review of Educational Research (March 2011) Vol. 81, No. 1, p.17.
[14] Izumi, Lance, et al., Short-Circuited: The Challenges Facing the Online Learning Revolution in California. Pacific Research Institute (December 2010) p.38.
[15] Means, Barbara, et al., Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies. U.S. Department of Education Office of Planning, Evaluation, and Policy Development (revised September 2010).
[16] Project Tomorrow, Learning in the 21st Century: 2011 Trends Update (June 2011) p. 5.
[17] http://www.mindresearch.net/

the teacher to know when the student is having difficulty. In schools that have implemented the program according to the guidelines issued by MRI, results have been very positive: at Madison Elementary School in Santa Ana, math proficiency rates rose from 25 percent to 89 percent in six years.

In other cases, a percentage of the school day is allotted for digital learning activities in a structured way – a blended-learning approach. A good example of a successful blended-learning school model in California is the Rocketship Mateo Sheedy Elementary charter school, which was founded in 2007 by software entrepreneur turned elementary school teacher John Danner and former Alum Rock School District principal Preston Smith. The school's focus is on low-income children. Rocketship uses a hybrid learning model in which a quarter of students' days are spent in a learning lab equipped with software programs geared to the individual abilities of students, designed to focus on math and literacy skills. The school emphasizes individualized instruction for pupils including an intervention program that allows teachers to address the specific needs of every student performing below grade-level proficiency. The daily block of time used in the Learning Lab combines computer curricula, independent reading, and enrichment programs that focus on skills in areas where students are struggling. The curricula, which include programs from Dream Box and Reasoning Mind, are adaptive: if a student gets a question correct during a laboratory exercise, the following questions become more difficult, but if they get it wrong, the software backs up and re-teaches the concepts.[18]

Rocketship Mateo Sheedy Elementary Charter School in California

- Focuses on low income children
- Uses hybrid Learning Model
- Emphasize on Individualized Instruction
- Daily block of time used in the Learning Lab combines computer curricula, independent reading, and enrichment programs that focus on skills in areas where students are struggling

The Rocketship model has been so successful that Rocketship Education charter network has been expanded to include three schools (Mateo Sheedy, Si Se Puede Academy and Los Suenos Academy) all of which are within the top 10 schools serving low-income students in Santa Clara County, with an overall score of 868 out of 1000 on the 2011 Academic Performance Index (API) growth score – well above the state average of 779, and the state target of 800.[19]

Virtual schools involve the most significant departure from the standard education model, eschewing the brick-and-mortar location and providing content entirely online. The approach is designed to allow students to spend all their school time working at their own pace, spending longer on those concepts or subjects that are more difficult, and moving quickly onto more challenging topics as soon as they are ready. Virtual schools also, in principle, allow schools to scale up much more easily, providing a full range of content designed and presented by

[18] Izumi, p. 112.

[19] http://rsed.org/index.php?page=academic-performance, accessed 3/3/12. NB Rocketship Education has also obtained authorization for four additional schools

qualified teachers, which circumvents the challenge of regional shortages of qualified teachers in disciplines such as mathematics and physical sciences. As of the 2010-2011 school year, California had at least 15,000 students enrolled in more than 70 virtual schools. Typically these offer a combination of full and part time services, such as the Riverside Virtual School, the largest district-run virtual school in California, which offers interactive online classes in partnership with the Riverside Unified School District. Although there is not enough data yet[20] to assess the impact that Riverside Virtual has had on the API of its full-time student body, the dedication of Riverside Unified to the program, and its aggressive focus on making digitally enhanced education available to economically disadvantaged students, contributed to Riverside's being named one of the 'Top Seven Intelligent Communities of 2011' by a group of international independent academic analysts.[21]

The strength of teaching to student's proficiencies is a major component of the shift to a successful digital learning framework. In a few states, online school funding is based on successful completion of coursework, instead of on time spent or a proxy for time. These examples are mostly applied to individual courses as opposed to entire schools. Florida (Florida Virtual School), Texas (Texas Virtual School Network), and Maine (Maine Online Learning Program) are examples of this.[22] In fact Florida has made proficiency measurement, rather than time spent, the primary metric for its education system overall, and the Florida Virtual School received a positive review of its performance by the Florida TaxWatch Center in 2008.[23] The rating was based on extensive research into student achievement, demographics, AP scores, and enrollment information. In other words, at both the school and state level, an adaptive approach based on proficiency and efficiency appears to work.

Challenges

The most frequent difficulties encountered in transitioning to digitally enhanced education generally correlate with a lack of a consistent vision on the system and process of education, and consequently with a weakly implemented program.[24] Realities of budget challenges and regional politics also play a factor. In Georgia, for example, a state charter school commission created in 2008 began authorizing online charter schools. However, the funding strategy developed by the commission was never put into effect, and the legislation that

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[20] Per the online API report generator at http://www.cde.ca.gov/ta/ac/ap/apireports.asp as of March 2012, only 30 students were included in the API report for Riverside Virtual Academy as of 2011. The API for this group was proficient (814) but the sample size is insufficient, particularly compared to the full-time enrollment overall of the school, to be conclusive.

[21] https://www.intelligentcommunity.org/index.php?src=gendocs&ref=Top7_2011

[22] Keeping Pace 2011, p.34.

[23] Florida TaxWatch. Final Report: A Comprehensive Report of Florida Virtual School. www.scribd.com/doc/47743217/Florida-Virtual-School-Report

[24] Istrate, Olympius, Current Issues of Digital Education: 6th International Conference on Virtual Learning (Oct 28-29, 2011) p. 96.

created the commission spawned a two-year legal battle after seven school systems sued to overturn the law. In May 2011, the Supreme Court of Georgia found the legislation creating the commission to be unconstitutional, ruling that the bill unlawfully granted the state authority to approve and fund charter schools over the objection of local school districts.[25] In short, what began as a promising online expansion has resulted in only two online charter schools operating under special extensions, at funding levels below what the commission had recommended.

Funding for digital education is a particular challenge. Overall, the education system spends proportionally less on information technology than other sectors, such as professional services and healthcare; according to one estimate that in 2010 U.S. primary and secondary schools spent some $9.2 billion on IT, just 1.6 percent of total spending. In contrast, comparable industries, such as professional services and health care, spent 4 percent to 6 percent on technology. If U.S. school systems invested in technology at the same level as other knowledge industries, the total investment would be $25 billion to $30 billion annually.[26]

The notion of increasing funding is untenable, of course, in the face of perennial budget shortfalls, particularly in California. Nonetheless for some, the notion of increasing digital education options is attractive because it offers, in principle, the possibility of saving money. There are many types of programs, variations in quality, and differences in cost structures (i.e., one school might spend much more on teaching and content and less on technology than another). Although funding and cost questions apply to district programs, state virtual schools and other providers, they are most commonly asked about full-time online schools. Nationally, per-pupil funding at full-time online schools is around $6,500, compared to $10,000 at a normal brick-and-mortar school (according to the EPE, CA spends less than $8,700 per pupil, ranking 47th in per pupil spending[27]). The allocation of funding for online students differs from normal schools as well (see Figure 2).

[25] Keeping Pace 2011, p. 33.
[26] Bailey, Allison & Puckett, J., Will Technology Fix our Education? MCT Campus (Oct. 5, 2011)
[27] Editorial Projects in Education Research Center, Quality Counts 2012, http://www.edweek.org/ew/qc/2012/16src.h31.html?intc=EW-QC12-CTR. N.B. EPE per-pupil figures are adjusted for regional cost differences.

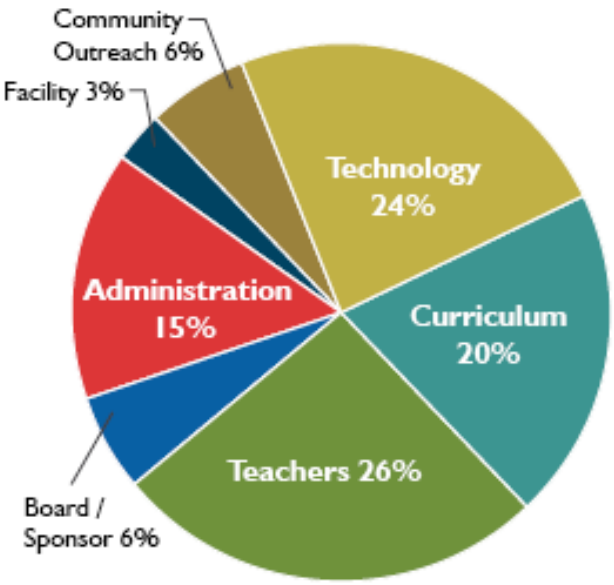

Figure 2. Typical cost categories for online schools. Source: Keeping Pace 2011.

A key factor in this differing allocation of funding is the reduced amount of time needed to fund faculty and administration. In fact, this accounts for virtually all of the savings in school models that use online or blended programs. A December 2011 analysis by the Legislative Analyst's Office concluded that a proposed ballot initiative which could lead to the expansion of online learning opportunities in the state supported this, stating that, aside from some initial administrative startup costs, that cost savings could be significant in the long term "If …pupil-teacher staffing ratios were to increase significantly and a large proportion of high school classes were converted to online, districts could realize savings from reduced personnel costs over time in the hundreds of millions of dollars annually."[28] This has indeed been the pattern at existing blended programs such as the Rocketship school, where cost savings are primarily derived from the fact that the Learning Lab block allows the school to employ only three teachers for every four classes. (See Figure 3 below.)

[28] Letter from Mac Taylor, Legislative Analyst, and Ana J. Matasantos, Dept. of Finance, to Hon. Kamara D. Harris, Attorney General, RE: A.G. File 11-0062 (Dec. 13, 2011)

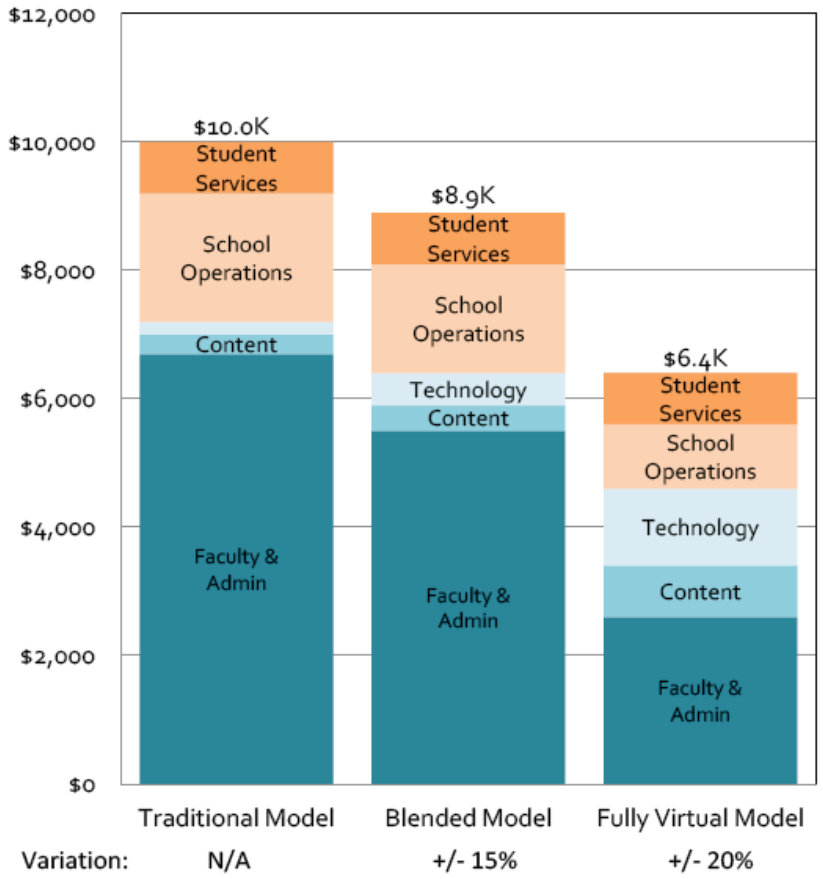

Figure 3: Estimated per-pupil expenditures in traditional, blended, and online models.[29]

However, even faced with the possibility of saving money, many digital education efforts have struggled in the absence of a viable long-term funding solution since standard education funding formulas in most states do not easily allow funding for online education no matter what the per-student cost. Some states, such as Tennessee, started online education systems using federal Enhancing Education Through Technology (E2T2) funds, which expired in 2011. As a result, Tennessee's rapidly growing state virtual school, which works in partnership with several districts to develop and distribute supplemental online courses, was left entirely unfunded in Fall 2011. Other states such as Texas had provided extra state funding on top of the standard education funding formula in order to pay for the more than 17,000 online student enrollments in the 2010-2011 school year. With new legislation making districts and open enrollment charter schools exclusively responsible for course costs beginning in Fall 2011, enrollment crashed.[30]

[29] Butler Battaglino, Tamara, et al. "The Costs of Online Learning." Creating Sound Policy for Digital Learning. Thomas B. Fordham Institute (January 10, 2012).
[30] Keeping Pace 2011, p.30.

California's K-12 education funding is also deeply inflexible. In a recent analysis, the Legislative Analysts' Office concluded that California's K-12 funding system is "overly complex, irrationally based on historical factors that no longer have relevance, inequitable, inefficient, and highly centralized."[31] The LAO also noted that while the Legislature has temporarily relaxed categorical spending requirements for districts, funds are still distributed based on historical patterns. Governor Brown has proposed modifications to the funding system that would ameliorate the situation by distributing some funding according to a new weighted student formula, phasing in the new funding formula over the next six years. However, while this might allow districts to expand blended programs, some programs - K-12 internet access spending, for example – will remain restricted. In addition, districts have shown a demonstrable reluctance to adopt new or different programs absent a guaranteed revenue stream to support them. At present, such revenue streams are most likely to come via partnership with private industry.

"Overly complex, irrationally based on historical factors that no longer have relevance, inequitable, inefficient, and highly centralized."

Tightly related to the issue of funding is the issue of staffing. California has limits on class size that do not differentiate for distance learning, and the official position of the California Federation of Teachers is that "enrollment in courses taught with the use of technology shall be limited for reasons of sound pedagogical principle." However, higher teacher-student ratios in digital learning environments need not translate to a less successful educational experience, as the Rocketship experience suggests. However, even here, policy issues create barriers. Because of California's seat-time requirements, time spent in the Learning Lab technically does not count towards total seat time, limiting the amount of time that can be allocated to the lab.

Another problem is the fact that it is not enough to simply put a student in front of a computer, no matter how well designed the software. Competent supervision and administration of the computer content needs to be in place; if it is not, or if the software/online learning is not used appropriately, students may not benefit from it. For example, the MRI software (which is designed for use in a regular classroom) has been demonstrated to work well if teachers make use of the information it provides and students complete at least 75 percent of the exercises in each level. However, below this level of participation, the program does not offer demonstrable benefits to students. MRI found that in the Los Angeles Unified district, for example, 35 to 40 percent of teachers did not follow the protocols, and student proficiency in these classes did not advance. Even more distressing is the fact that district administrators were apparently surprised, not that 40 percent of teachers failed to follow the protocols, but that 60 percent did.[32]

Quality Control

Digitally enhanced learning poses a dilemma when it comes to ensuring quality. One of the great advantages of online learning is that it makes “unbundling” school provision possible -

[31] Legislative Analyst's Office, Restructuring the K-12 Funding System.
[32] Related by MRI CEO Ted Smith, Izumi, p.108.

that is, it allows children to be served by providers from almost anywhere, in new and more customized ways. But taking advantage of the opportunities online learning offers means that there is no longer one conventional "school" to hold accountable. Policymakers and educational practitioners need to find new ways to monitor and police quality. California's current system relies in large part on state-specific credentials, staffing ratios, instructional hours, and school days. Transitioning to a system in which student outcomes are used as a primary means of validating the quality of online resources poses a significant paradigm shift for most traditional education systems, including California's.

"…beyond narrow evidence focused on short-term results on standardized tests, focused overwhelmingly on reading and math, and focused exclusively on supplemental online education, the research in this area is extremely limited"

Concerns about quality control in online education were heightened in September 2011 after Minnesota released a detailed audit of its online schools which found that full-time online students were less likely to complete courses and overall showed significantly lower proficiency rates in mathematics.[33] Reports from Pennsylvania and Colorado reported similar results.[34] In general, the studies that have been done have focused on blended-model programs; a literature review in October 2011 found that "…beyond narrow evidence focused on short-term results on standardized tests, focused overwhelmingly on reading and math, and focused exclusively on supplemental online education, the research in this area is extremely limited" and that "there exists no evidence from research that full-time virtual schooling at the K-12 level is an adequate replacement for traditional face-to-face teaching and learning. "[35] There is thus little for policy makers to go on when undertaking potentially radical changes in their education models.

There are three basic approaches to ensuring the quality of online education options, each of which has its own limitations:[36]

- **Input and process regulation** (setting minimum standards for online resources);
- **Outcome-based accountability** (reviewing resources according to student results over time); and
- **Market-based quality control** (users choose preferred content providers and reward successful systems).

[33] Office of the Legislative Auditor, State of Minnesota, Evaluation Report: K-12 Online Learning. (September 2011). The audit looked at both student proficiency and student growth.
[34] Center for Research on Education Outcomes, Charter School Performance in Pennsylvania (April 4, 2011) and Colorado Department of Education, Summary Report of the Operations and Activities of Online Programs in Colorado (June 1, 2011).
[35] G. V Glass & K.G. Welner, Online K-12 Schooling in the U.S.: Uncertain Private Ventures in Need of Public Regulation. (October, 2011) Boulder, CO: National Education Policy Center.
[36] Frederic M. Hess, " Quality Control in K–12 Digital Learning: Three (Imperfect) Approaches," Creating Healthy Policy for Digital Learning. Thomas B. Fordham Institute (July 2011) p. 2.

In California, as in most states, there exist policy elements that address each of these areas. For input and process regulation, the California Learning Resource Network (CLRN) provides educators with a "one-stop" resource for critical information needed for the selection of supplemental electronic learning resources aligned to the State Board of Education academic content standards. CLRN enlists qualified, specially trained reviewers to review supplemental online educational materials according to the State Board of Education approved review criteria which covers three areas: Legal Compliance, Standards Alignment, and Minimum Requirements.[37] API scores can be used for outcomes-based accountability, at least for full-time virtual schools.

However, these are not comprehensive measures. CLRN's role is to recommend, not mandate; resources on CLRN are approved for "social content only" and are "NOT state adopted."[38] Virtual schools are for the most part too new to have generated any significant longitudinal data on student outcomes, and existing state policies and data systems are not yet good at differentiating results between providers in a way that can reward positive outcomes. API scores in California, for example, are designed to track student achievement by school, district, county, and state. They can be used to measure student performance in virtual schools, or in dedicated blended programs such as the Rocketship schools; they cannot be readily used however to assess the impact of individual online courses.

Concerns about quality standards of online courses have led the University of California to move cautiously in approving them to fulfill the 'a-g' requirements. As of January 1 2012, both the online provider application and the online partnership application for UC have been placed on temporary hold while UC analyzes its criteria and process for determining quality online courses; the policy revisions are expected to be completed by the 2012-2013 academic year.[39]

Currently, UC has a preapproved vendor list of 18 online providers who have passed UC's approval procedures for providing a-g courses. It also permits the principal of a student's home high school to certify non-UC-approved online courses to fulfill the UC subject requirements. This must be done course by course, however.

Teacher Training

It goes without saying that in order to integrate online learning into the education process, particularly in a blended environment combining traditional instruction with newer technologies, that the teachers involved must be part of the process. Currently, however, digital technologies are still treated as a novelty. Some teacher preparation programs in California, such as CSU Eastbay, offer an optional "Online Teaching and Learning Certificate" program. However, this coursework is strictly supplemental and none of the courses in the Online Teaching & Learning programs (Certificate or Masters) are directly applicable to a California

[37] http://www.clrn.org/home/about.cfm
[38] Ibid.
[39] http://www.ucop.edu/a-gGuide/ag/online_course.html

teaching credential.[40] In other words, digital literacy is seen as a supplemental, rather than a core, skill set for teachers in preparation.

As noted above, MRI CEO Smith observed that teacher unfamiliarity with digital tools was a factor hindering effective use of the ST Math software, and that only a small minority of teachers is technologically savvy enough to fully take advantage of digital educational tools even when they are available. He estimated that it might take decades for the teacher corps as a whole to be ready to handle ever-changing technology.

This does not mean that teachers are not capable of engagement with digital learning tools, or uninterested. It simply means that digital competencies have not to date been a core element of teacher preparation.

Regional Restrictions

One of the most frequently cited impediments to California's digitally enhanced education is the "contiguous county" rule. Put simply, current California law[41] restricts funding geographically, allowing community schools and independent study programs to claim average daily attendance apportionments for only those pupils who reside in the county where the apportionment claim is reported, or who reside in an immediately adjacent county. In other words, in order for online students to be funded, enrollment in virtual schools must be local.

This poses two problems. First and foremost, it negates one of the primary advantages of online education – the ability to distribute educational content to areas where teachers might not be readily available or where expertise exists. This is a particularly pressing issue for economically disadvantaged students in areas where the state has not been able to maintain adequate staffing levels of qualified teachers, particularly in subjects such as mathematics and physical sciences. It is especially challenging for schools that may not offer enough a-g courses to meet the needs of their student bodies' requirements for UC:[42] many of the online provider programs currently approved by UC are not even based in California.

The geographical restriction also requires schools and districts to develop or acquire content locally, resulting in a wide range of systems, software, and vendors. The CLRN attempts to serve as a central clearinghouse for information on resources schools can use statewide, but has a limited scope. Some local programs, such as the Pacific Coast High School, have formed consortia to share online courses developed by member schools. None of these consortia serves the entire state, however. Moreover, for some schools and districts that struggle to staff schools with certified mathematics and science teachers, regional resources are often simply not available. In the absence of a coherent state strategy and standards for online education,

[40] http://www.ce.csueastbay.edu/certificate/online_teaching/index.shtml

[41] Education Code Section 51747.3. For details, see California Education Codes and California Administrative Codes of Regulations governing Digitally Enhanced Education: K-12 Schools (CCST, April 2012).

[42] According to a metric suggested by one study (UCLA Idea, California Educational Opportunity Report (2009), at least 2/3 of a high school's courses should be A-G in order to adequately serve its student body.

there is an uneven distribution of resources throughout the state, with unnecessary duplication of vetting and resources at the local level.in some areas and limited options in others.

III. California Digital Education: 2011-2012

As of today, California law does not make formal distinctions between distance learning, online learning and online instruction: the California Distance Learning Policy was put in place 21 years ago and has not been modified since, and is in apparent conflict with other sections of the state education code.[43] The limitations hindering the expansion of digital education in California have not gone unnoticed, and the importance of digital education has been given new urgency, not just in the context of the education system, but in the context of the state's overall economic well being. As a result, there have been several efforts to address the challenges facing digitally enhanced education in California in 2011 and early 2012.

Most of these efforts address one or more of the four pillars identified by the CCST i2i project:[44] a 21st century classroom environment; teachers with the necessary technological skills, able to work collaboratively with students and other educators; an institutional infrastructure which enables the use of technology; and public-private partnerships. Thus far, these essential elements of the digital landscape have not been promoted as an integrated strategy. Following are some of the new and continuing initiatives and actions that support one or more of the pillars.

AB 802 and the Online Bill of Rights (Classroom Environment, Infrastructure)
This bill, introduced by Assembly Member Blumenfeld in February 2011 and later co-sponsored by Assembly Member Cook, was an attempt to change the requirement that students be physically present at a particular time of day on a traditional bricks-and-mortar campus in order for the school to qualify for state funding for that student. Commencing with the 2013-14 fiscal year, the bill stated that "…school districts, county offices of education, and charter schools that offer online education courses may claim attendance toward average daily attendance on the basis of a pupil's attendance in an online course or courses that satisfy prescribed criteria."[45] The bill was unanimously passed by the Assembly Education Committee but did not pass in the Appropriations Committee without comment.

[43] Ibid.
[44] See Table 2, above.
[45] http://leginfo.ca.gov/

Blumfield has indicated that he plans to resurrect the bill in 2012, but the failure of AB 802 was sufficiently frustrating to prompt Riverside Unified School District: Superintendent Rick Miller and David Haglund, principal of Riverside Virtual School to launch a plan to place an online learning initiative on the November 2012 ballot. If passed, the Online K-12 Education/College Preparatory Courses Initiative Statute would:

California Students Bill of Rights

- Authorize school districts, county offices of education, and charter schools to claim average daily attendance funding for student participation in approved online courses.
- Authorize school districts to contract with public and private providers to deliver online courses taught by credentialed teachers.
- Allow students to take online courses offered by any school district, regardless of student's residence.
- Provide students access to courses required for admission to state universities, and establishes the California Diploma, which demonstrates completion of courses required for University of California and California State University admission.[46]

The intent of the California Student Bill of Rights is to greatly expand high school online education, while breaking down geographic and other barriers that are denying many rural and urban students equal opportunities to attend a four-year public university. If their schools don't offer AP history, or if calculus conflicts with their schedules, students could take the course through another publicly funded program. The initiative would also create a California Diploma for students who have accumulated the credits, known as A-G, for entry into UC or CSU, however and wherever they've taken the courses – in school, online, in one or more districts. The fiscal impact analysis by the Legislative Analyst and Director of Finance found that the bill could potentially lead to savings of hundreds of millions of dollars annually if schools experience efficiencies and widespread participation in the use of online courses.

Online Education Index (Classroom Environment, Infrastructure)

In October 2011 the California Department of Education unveiled a new Online Education Index[47] on the CDE website. Using an interactive map, users can obtain a list of online programs and schools in the county they select. Each listing tells the user whether the program or school is tracked by the California Department of Education, which grades are served, whether it is accredited, whether its courses meet the "a-g" subject requirements for admission to the University of California, enrollment information, curriculum and programs offered, and which counties are served by the school or program.

The new Web resources were created in response to calls to the California Department of Education from the public about how to find online schools and programs that are legitimate. A

[46] Initiative 11-0062

[47] http://pubs.cde.ca.gov/tcsii/onlineeducation/onlineeducindex.aspx

fourth resource has been planned to update kindergarten through grade twelve online policies and practices. An update to the 2006 "The State of Online Education in California" report will summarize digital education research, outline current policy challenges, and provide models of online instruction.

K-12 High Speed Network (Infrastructure)

The K12 HSN[48] is a state program funded by the California Department of Education whose focus is on providing California's K-12 community with network connectivity, diagnostics, teaching and learning application coordination, and videoconferencing coordination and support. Its mission is to enable educators, students and staff across the state to have access to reliable high speed network which has the capacity to deliver high quality online resources to support teaching and learning and promote academic achievement. It administers K-12 participation through CalREN, a high-speed, high-bandwidth statewide network of 14 Hub Sites and circuits linking to 72 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.

As per the proposed budget for 2012-13, appropriations for K12 HSN are unchanged[49] at approximately $10.4 million. Expansion has continued throughout 2011 and early 2012, with network and internet services to the 72 K-12 Node Sites extended to 81% (7,646) of schools, 87% (863) of school districts, and 100% (58) of county offices of education in California, providing connectivity to over 5 million students.

Brokers of Expertise (Teachers)

In recognition of the need to connect educators with one another to enable them to collaborate and think more critically about their practice and to provide them effective tools as they attempt to close the achievement gap and raise overall student achievement across California, the CDE collaborated with the K12 HSN to establish the Brokers of Expertise (BoE) initiative[50] to embrace technology and provide effective tools and resources to schools and districts as they strive to reach ambitious goals for student achievement.

The BoE was intended to offer online resources that:

- Provide classroom tools and resources that are aligned to California Content Standards
- Provide resources that are searchable by grade, content level and demographic information
- Provide opportunities for creating and publishing high-quality content that has proven effective for teachers
- Facilitate communication and dialogue with educators across the state who have similar questions

[48] http://www.k12hsn.org/
[49] http://www.ebudget.ca.gov/StateAgencyBudgets/6010/agency.html.
[50] http://www.myboe.org/

In 2011 this program moved beyond the pilot stage and is now fully operational, working to engage educators throughout the state and provide both content and pedagogically focused support.

Digital Promise (Infrastructure)

In October a new website was launched by Digital Promise[51], an independent 501(c)(3), created through Section 802 of the federal Higher Education Opportunity Act of 2008, authorizing a nonprofit corporation known as the National Center for Research in Advanced Information and Digital Technologies (Digital Promise). According to the statute, Digital Promise's purpose is "to support a comprehensive research and development program to harness the increasing capacity of advanced information and digital technologies to improve all levels of learning and education, formal and informal, in order to provide Americans with the knowledge and skills needed to compete in the global economy."

Joint Ventures (Public/Private Partnerships)

There are numerous examples of schools and programs in California that are the result of partnerships between the public school system, institutions of higher education, and/or private industry.

In some cases, the partnerships are local, such as the USC Hybrid High School, a new charter school set to open in fall 2012, which is a partnership between the Rossier School of Education at the University of Southern California and Ednovate, a nonprofit organization created by USC. Ednovate is designed specifically for high school students most at risk of dropping out. The charter school is set to open with about 150 ninth graders, and will add a new group of 9th graders each year until it reaches capacity at 600 students in grades 9-12. Operating in a physical setting, it is a hybrid school that will offer online curriculum delivery and student support in a brick-and-mortar setting. Ednovate's mission is to eliminate the dropout problem and prepare every student for success in post-secondary education and in the workplace. To do this, Ednovate will, over time, open and support a network of replicable charter high schools across the metropolitan Los Angeles region and, ultimately, will expand to other urban centers across the nation.

In other cases, private providers of online content partner with public school systems to offer services. K12 Inc. is one of the nation's largest providers of online content. It runs its own fully private virtual schools, but its content is also available in California via the California Virtual Academies (CAVA),[52] a tuition-free public school that uses the K12 curriculum, which is accessed via an online school as well as through more traditional methods. Materials are delivered right to the student's doorstep, including books and CDs; parents and students are also partnered with a state-credentialed teacher to guide and track their progress through the curriculum. There are regular, face-to-face meetings as well. There are nine CAVA schools currently,

[51] http://www.digitalpromise.org/
[52] http://www.k12.com/cava

enrolling a combined total of more than 7,100 students, which had an average API of 727 in 2011.[53]

It should be noted that many states that have implemented blended and virtual schools into their education systems do so in similar partnership with private providers. Florida and Texas, for instance, both have wide-scale partnerships with Learning.com.

Goorulearning.org (Infrastructure, Teachers, Public/Private Partnerships)

Gooru[54] is a search engine for learning developed by a 501(c)(3) nonprofit organization whose mission is to honor the human right to education. Teachers and students use Gooru to search for collections of multimedia resources, digital textbooks, videos, games and quizzes created by educators in the Gooru community. Collections are aligned to standards and currently cover every Math and Science topic from 5th-12th grade, with other subjects coming soon. Gooru is free of cost and has no ads.

Gooru harnesses the best content on the web, expertise from leaders in the field, and communities of passionate educators to provide a complete learning solution. Teachers from California schools and the rest of the country are co-creating Gooru, vetting and organizing collections of the web's best educational resources. They have created over 5,000 collections that are aligned to Common Core Standards for Math and California Science Curriculum Standards, and have worked to ensure that all collections are age-appropriate. Gooru's high-quality content will continue to improve as more teachers share their knowledge and materials, creating an innovative teaching and learning ecosystem.

Using machine learning and human judgment, Gooru curates, auto-tags and contextualizes collections of web resources to accommodate personalized learning pathways. Multimedia resources available on Gooru are intended to dramatically increase student engagement and motivation to learn by connecting topics with 21st century resources and real life applications. Particularly interesting is Gooru's ability to connect student performance on quizzes with the resources they used previously, allowing the search engine to factor in the effectiveness of the resources along with educator input in evaluating content. Gooru is scheduled to be openly available in June 2012 with its scheduled beta launch. Gooru has established a roadmap based on a number of teacher inputs and is seeking to co-create this solution with teachers and students to meet their needs.

Transitioning Through Loss of Funding

California lost two valuable tools for building a digitally enhanced education system in 2011. A major federally funded program, Enhancing Education through Technology (EETT), sunseted in 2011 without specific legislation to replace it. EETT was the major source of funding for a variety of K-12 educational technology programs for six years, including formula grants to districts for professional development, implementation of approved educational technology

[53] http://api.cde.ca.gov/Acnt2011
[54] http://www.goorulearning.org/

plans, and the use of technology to support use of enhanced data management systems by educators to facilitate use of student data in academic and career planning for students in grades 7-12. The California Technology Assistance Project (CTAP), a statewide technical assistance program funded by CDE, is helping districts complete technology plans funded with EETT funds and continuing to promote the effective use of technology at schools and districts based on local needs in each of 11 districts in the state. CTAP funding remained relatively stable in the proposed 2012-13 budget[55] compared with the previous year, although at least one of the eleven CTAP regions has been closed and others have seen funding shifted to other programs as counties realign spending priorities for Proposition 98 educational funds.

Another significant loss was the discontinuation of the California Teacher Integrated Data Education System (CALTIDES), a system that was to be administered jointly by the CDE and California Commission on Teacher Credentialing (CCTC). This data system was authorized to complement the California Longitudinal Pupil Achievement Data System (CALPADS), providing information on teacher credentials and authorizations as well as information on teachers' educational backgrounds (e.g., university attended to obtain teaching credential).[56] Although the task of assigning a unique identifier to all California educators was completed, the funding to create CALTIDES was vetoed from the 2011–12 budget. CCTC will continue to issue unique identifiers to anyone who receives a credential or authorization. But the elimination of CALTIDES means that it will be more difficult to merge data held by CCTC on individuals' credentials, preparation, and educational backgrounds with information from CALPADS about those individuals who become educators in California because the existing CCTC data infrastructure was not built to facilitate this type of merging. This makes it difficult for the state to assess teacher impact on student outcomes, crucial information as the state works to integrate new digitally enhanced coursework and pedagogy into the system.

The budget cuts in recent years have also affected the state's ability to support digital education in a number of ways, notably its ability to offer the professional development and support that the teaching workforce needs to keep pace with the new digital landscape. From 2007–08 through 2010–11, California districts and schools were dealt over $20 billion in cumulative cuts.[57] Districts have responded with numerous measures, including scaling back support and professional development for teachers as well as increasing class size and laying off teaching and administrative staff. Facing large reductions in overall revenue, many districts have taken advantage of funding flexibility and have shifted funds away from a variety of programs related to teacher training and development in order to offset shortfalls elsewhere.

[55] Proposed budget published January 2012, op.cit.
[56] Center for the Future of Teaching and Learning, Status of the Teaching Profession 2011 (December 2011) pp. 38-39.
[57] Ibid, p.x.

IV. Moving forward

The value of digitally enhanced K-12 education, particularly to a high-tech state such as California, has been repeatedly documented in the past few years. California has extensive online and blended learning activity, including extensive activity at a local level. By 2010 it had a combined enrollment of over 15,000 students in more than 70 full-time virtual charter schools. It has numerous innovative public/private partnerships and some highly successful blended programs. Digital education is a topic of concern for state policy, education, and academic leaders. So why does California compare so poorly with other states in the realm of digital education?

One of the principal strengths that states with better established or more successful digital learning programs share is a *consistent vision of digital education that is manifested statewide*. The Florida Virtual School, the largest and one of the oldest virtual school systems in the nation, is a special statewide district available to all students. Texas created a statewide network to provide supplemental online courses in 2007, and a virtual public school act in 2011.[58] Utah, which received the highest score awarded by DLN, passed a Statewide Online Education Program in 2011 that was directly based on the ten elements of high quality digital learning.[59]

States without such a vision, however, suffer in comparison. New York – one of the largest states in the country after California, and one that also boasts one of the country's largest high-tech sectors – has relatively little online learning. The state created a comprehensive state education technology plan in 2010, allowing for – among other things - the creation of virtual schools,[60] but the state Board of Regents declined to authorize full-time online charter schools because they interpreted the language in the statute prohibiting multiple locations for one charter to apply to online charter schools. In other words, the state is deadlocked with conflicting policies, leaving the only progress in digital education to occur at the local and district level.

California, likewise, also does not have a consistent statewide digital policy framework. As one evaluation put it, California has succeeded in creating the "most complicated, confusing and impenetrable set of policies in any other state."[61] There is no lack of interest in increasing digitally enhanced education opportunities in California; the logistics, however, are daunting. There are vast discrepancies in the technology available for teachers to use in their classrooms, from district to district, school to school, and even classroom to classroom. Some specific obstacles can be addressed (more on which in the second volume of this report). Doing so piecemeal, however, will have a more limited effect if an overall vision is not embraced by California.

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[58] House Bill 1030, retrieved August 21, 2011; http://www.capitol.tn.gov/Bills/107/Bill/HB1030.pdf
[59] SB65; http://le.utah.gov/~2011/bills/sbillint/sb0065s01.htm
[60] New York Statewide Educational Technology Plan, http://www.p12.nysed.gov/technology/
[61] California County Superintendents Educational Services Association, California eLearning Framework (August 2011) p.64.

V. Concluding remarks

There are some obvious, immediate barriers California needs to address in order to improve its digitally enhanced education. Volume 2 of this project provides more detail on specific regulations impacting digital education in the state, and offers specific recommendations on addressing them. Nonetheless there are other, longer-term questions that California could be asking as well. Should the state provide for reciprocity agreements with other states for purposes of providing online delivery of instructional services by high quality master teachers, i.e. between California and another state or states where the reciprocity agreement is in place? Should the California Commission on Teacher Credentialing develop a master teacher certification program allowing qualified teachers in California to deliver online instruction both within and outside of California? Should California's professional development resources provide for training for high quality credentialed teachers to become "master teachers" (to be defined) for purposes of delivering instruction online both in California and in one or more states having reciprocity agreement with California for this purpose? These are questions that few states have addressed, and merit consideration.

California has a legacy of forward-thinking policy frameworks where science and technology are concerned. In the arena of virtual schools and online learning, a lack of consistent vision, combined with a complex educational code, have left the state uncharacteristically behind the curve. California needs to clarify its vision for digitally enhanced education, apply it consistently, and begin asking forward-thinking questions again.