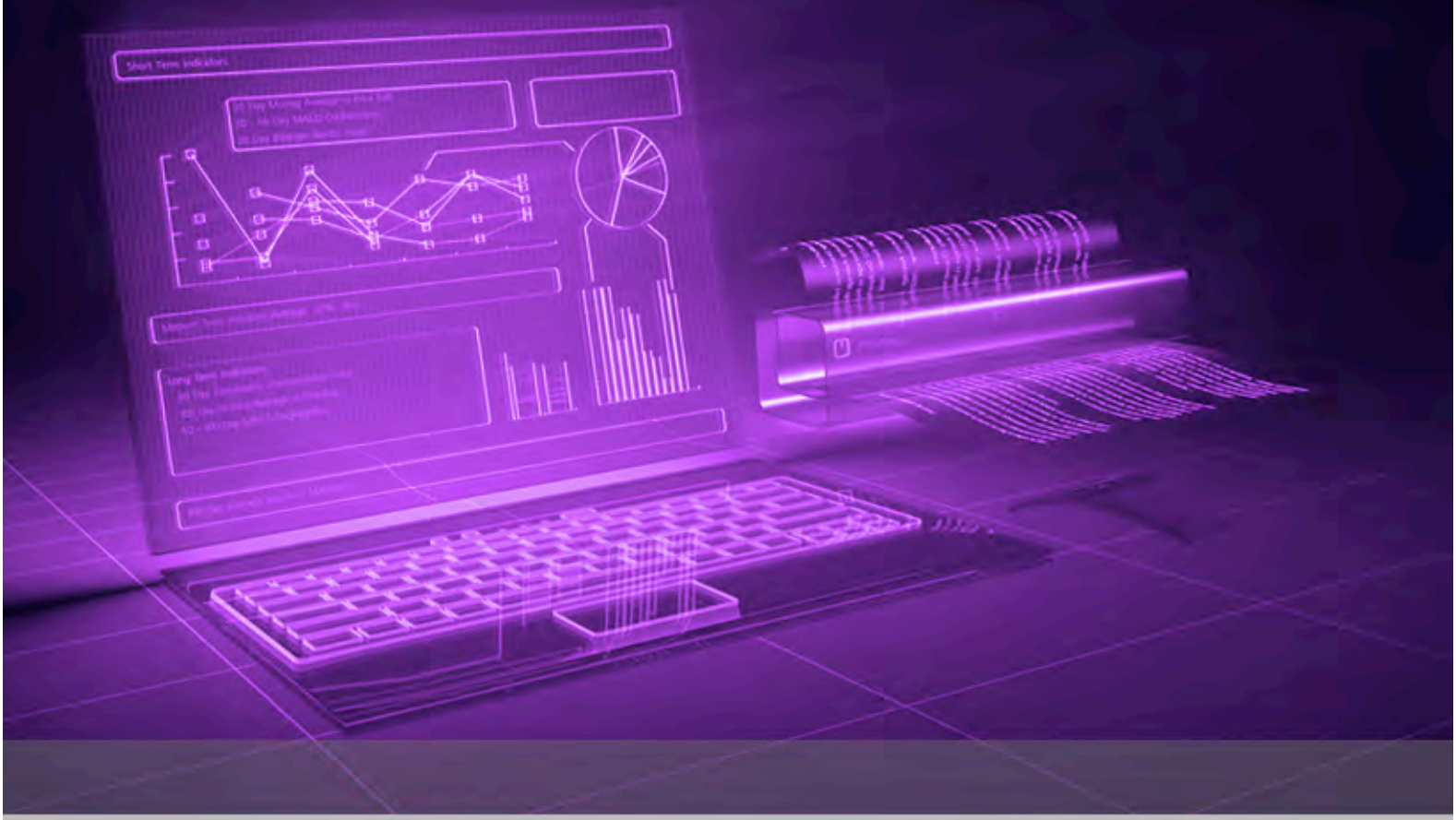
Digitally Enhanced Education in California



Educational Technology and Digital Media Use in California's Teacher Preparation Programs: A Status Report

California Council on Science and Technology

August 2012

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Background

In 2011, the California Council on Science and Technology (CCST) published a white paper on digitally enhanced education in California in preparation for a summit convened by the California Teacher Advisory Council (Cal TAC). The Summit was part of CCST's *Innovate to Innovation (i2i)*, a multi-faceted project intended to assess key aspects of California's innovation 'ecosystem.' One of the four areas of recommendations resulting from i2i concerned the need for California to "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 rate" (CCST, 2011, p. 4). Expecting teachers to succeed in such an environment requires changes in how they are prepared prior to entering the classroom and supported once they are responsible for their own classrooms. This paper is designed to inform the conversation at the upcoming "Summit on the Integration of Digital Media into Teacher Preparation" about the status of California's teacher preparation programs with regard to ensuring teachers have the knowledge and skill to deliver a relevant 21st century curriculum to students. Specifically, it provides an overview of the importance of adapting teacher preparation programs to effectively integrate educational technology and digital media, the barriers and challenges to doing so, current approaches, possible avenues for change as well as some next steps.

Introduction

There is no turning back from the technological age in which we now live. Advanced technology surrounds us in our homes and work lives and has significantly affected the way the world operates. Yet the increasingly routine use of and dependence on technology are not reflected in the way schools and classrooms are organized. This creates a conflict for students who are accustomed to instant access to information outside of school walls yet often told to put away their devices when entering the classroom. This glaring gap in the student experience jeopardizes our collective ability to prepare students with the skills necessary for life in the 21st century.

Twenty-first century skills for students include *information, communications, and technology literacy skills* that reflect the ability to access and evaluate information critically and competently, as well as manage the flow of information from a wide variety of sources. Further, they include the ability to use technology as a tool to research, organize, evaluate and communicate information. To help students acquire these skills, teachers need to be able to "successfully align technologies with content and pedagogy and developing the ability to creatively use technologies to meet specific learning needs" (AACTE, 2010, pp. 10-11). (For more detail on skills, please see Appendix A).

In response to the rapid evolution of the ways in which students access information, there has long been a call for better integration of technology into teacher preparation programs, including statements such as the following from 1999, which still rings true today: "These programs should increase teachers' exposure to appropriate technology if they are to aptly

prepare them for today's classrooms" (Milken Exchange & ISTE, 1999). A set of characteristics proposed[1] for the 21st century teacher would include the ability to:

- Facilitate and inspire student learning and creativity so that all students achieve in the global society.
- Enable students to maximize the potential of their formal and informal learning experiences.
- Facilitate learning in multiple modalities.
- Work as effective members of learning teams.
- Use the full range of digital-age learning tools to improve student engagement and achievement.
- Work with their students to co-create new learning opportunities.
- Use student data to support student learning and program improvement.
- Be lifelong learners.
- Be global educators.
- Work with policy leaders as change agents.

The next section examines the reasons why change toward ensuring this set of characteristics in novice teachers has been so slow in coming.

[1] This set of characteristics was proposed by participants at a 2009 invitational summit held in Austin, TX. For more information about the summit and its recommendations, please see: *Redefining teacher education for digital-age learners: A call to action*. The full text of the summit's summary report is also included as part of the briefing packet for "Summit on the Integration of Digital Media into Teacher Preparation."

I. Overview of Barriers and Challenges

Although there is general agreement that most teacher preparation programs in California are behind the curve in adapting to the "always on" information society, there are many reasons for this and no easy solutions.

One of the biggest barriers to changing teacher preparation programs is the current budget crisis. Not only do schools of education lack the funds to purchase technological tools for use with their teacher candidates, they also lack the professional development resources necessary for training faculty in how they could effectively integrate these tools into their courses. Granted, some low-cost solutions to this problem may exist, but when dealing with a budget crisis of this magnitude, schools of education struggle just to maintain the *status quo*, let alone take on new initiatives that require a significant investment in time for research, exploration and testing.

Even if budget constraints eased, another formidable barrier to the integration of technology into teacher preparation programs remains: the ***lack of a coherent and consistent state vision*** encouraging the use of educational technology at any point in the education system. Districts and schools that have begun to integrate technology into the instruction they provide to students have had to do so of their own initiative and rely heavily on teacher professional development. They are often hampered by policies, such as overly burdensome firewalls and regulations disallowing student use of cell phones in the classroom, which impede their efforts and restrict students' and teachers' ability to access the wealth of available resources. If California wanted to ensure that the state's teachers and students were operating within a system aligned with 21st century education goals, a critical first step would be to create and advocate for a state vision that explicitly details the steps necessary for meeting those goals at every point in the education system.

What do Future Teachers Have to Say?

The "Speak Up National Research Project" surveyed nearly 2,000 future teachers from November 2009-February 2010.

About one-quarter of future teachers who responded to the survey indicated that they are learning how to use Internet-based tools in their teaching methods course; however, the primary skills being taught are how to use productivity tools such as word processing, spreadsheets, etc.

When asked to envision the classroom of the future, prospective teachers saw themselves incorporating mobile devices and laptops or tablets into their instruction. Yet "the majority of future teachers do not have the experience or skill to effectively integrate these devices."

And "when asked which experiences would best prepare them to teach in a 21st century classroom," the future teachers' top five picks include learning how to use technology to differentiate instruction for students (75%), incorporating digital resources in a lesson (68%), locating and using electronic teaching aides (67%), creating and utilizing videos or podcasts within a lesson (57%) and using electronic productivity tools (57%).

Source: Project Tomorrow, 2010, pp. 6-12.

One key venue for demonstrating such a state vision would be the standards that guide the education of teachers. California has a number of standards to guide the preparation, induction and professional practice of teachers. However, they vary in the degree to which they detail and emphasize the use of technology in the classroom. California's Teaching Performance Expectations have no overt references to "technology" while the Standards for the Teaching Profession include four references to the word and the Induction Program Standards has just a paragraph covering the topic.[2] The Multiple Subject and Single Subject Preliminary Credential Program Standards include specific language on "Using Technology in the Classroom" (see Standard 11 in text box on next page).

[2] "Participating teachers are fluent, critical users of technological resources and use available technology to assess, plan, and deliver instruction so all students can learn. Participating teachers enable students to use technology to advance their learning. Local district technology policies are followed by participating teachers when implementing strategies to maximize student learning and awareness around privacy, security, and safety" (CTC, 2008, p. 8).

Standard 11: Using Technology in the Classroom

Through planned prerequisites and/or professional preparation, the teacher preparation program ensures the following:

Candidates are familiar with basic principles of operation of computer hardware and software, and implements basic troubleshooting techniques for computer systems and related peripheral devices before accessing the appropriate avenue of technical support.

Candidates use appropriate technology to facilitate the teaching and learning process.
Candidates are able to evaluate and select a wide array of technologies for relevance, effectiveness, and alignment with state-adopted academic content standards, and the value they add to student learning.

Candidates demonstrate knowledge and understanding of the legal and ethical issues related to the use of technology, including copyright issues and issues of privacy, security, safety, and acceptable use. Candidates demonstrate knowledge and understanding of the appropriate use of computer-based technology for information collection, analysis, and management in the instructional setting.

Candidates demonstrate competence in the use of electronic research tools and the ability to assess the authenticity, reliability, and bias of the data gathered. Candidates analyze best practices and research on the use of technology to deliver lessons that enhance student learning.

Candidates integrate technology-related tools into the educational experience and provide equitable access to available resources to all students. Candidates encourage the use of technology with students in their research, learning activities, and presentations.

Candidates use computer applications to manipulate and analyze data as a tool for assessing student learning, informing instruction, managing records, and providing feedback to students and their parents.

Candidates learn to use a variety of technologies to collaborate and communicate with students, colleagues, school support personnel, and families to provide the full

This standard underscores the expectation that technology will have a presence in teacher preparation, but is not advanced or sophisticated enough for the current technological environment. And, as currently framed, it will not be sufficient to carry the weight of the state's vision around the need for all teachers to have the skills necessary for preparing students for the 21st century.

Another set of standards to consider in moving forward with a state vision is the International Society for Technology in Education's (ISTE) "National Educational Technology Standards and Performance Indicators for Teachers."[3] These standards expect all classroom teachers to:

- Demonstrate a sound understanding of technology operations and concepts
- Plan and design effective learning environments and experiences supported by technology
- Implement curriculum plans that include methods and strategies for applying technology to maximize student learning
- Apply technology to facilitate a variety of effective assessment and evaluation strategies
- Use technology to enhance their productivity and professional practice, and
- Understand the social, ethical, legal, and human issues surrounding the use of technology in PK–12 schools and apply that understanding in practice.

The ISTE standards do not appear to be substantially different from California's standards but as discussed in the next section, even with Standard 11 in place, it's unclear exactly how much training in technology teacher candidates actually receive.

[3] Please see Appendix B for details on the ISTE Standards for Teachers.

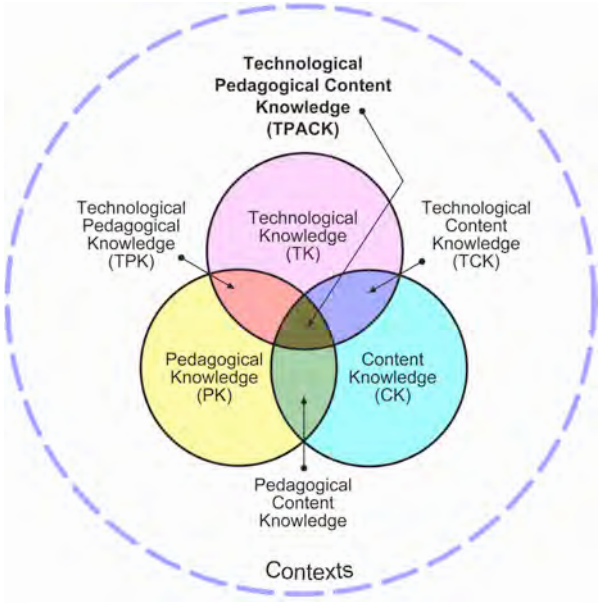
II. Current Approaches in Teacher Preparation

Initially, CCST attempted to identify the state's most innovative teacher preparation programs that had developed successful models for integrating technology into their teacher preparation programs. Our definition of "integrating technology into teacher preparation programs" goes beyond the simple use of technology in projects and assignments and extends to discussions of how to ***transfer*** those skills into the prospective teacher's future classroom and teaching practice. The findings from that research revealed that such programs do not yet exist on a wide scale, though there are "islands of innovation" and emerging initiatives that represent potential for significant change.

Program Approaches: Stand-alone or Integrated

Teacher preparation programs generally appear to address technology in one of two ways. They either offer a stand-alone course for prospective teachers, which varies in the amount of technology incorporated into the syllabus, or they choose to "integrate" the technology across the other courses in the program. Each of these approaches has its pros and cons, depending on actual implementation.

Figure 1. Technological Pedagogical Content Knowledge Model



Source: www.tpck.org

In the **stand-alone** approach, teacher preparation programs were identified that offered a course solely focused on instructional technology and included opportunities to engage in real-world applications of Web 2.0 tools such as blogs, wikis, social networking and digital media, as well as discussions on how to critically analyze the quality of online material. However, there were also programs that offered technology as one component to their larger curriculum and instruction course. Given the short amount of time devoted to technology in courses such as these, it is unclear how resources and areas for discussion are prioritized. Research has shown, however, that the most common instruction around technology is focused on the use of word processing, spreadsheet and database programs (Project Tomorrow, 2010).

In the **integrated** approach, teacher preparation programs build technology instruction into the other required courses. Conversations with a number of faculty reveal that this might be occurring in a very cursory manner, such as the inclusion of an assignment that requires the creation of a PowerPoint or video. In contrast, a model for the effective integration of technology into methods courses has been put forward under the Technological Pedagogical

Content Knowledge (TPACK) framework.[4] This framework "describes the kinds of knowledge needed by a teacher for effective integration of technology in all content areas…and argues that effective technology integration for teaching specific content or subject matter requires understanding and negotiating the relationships between these three components: technology, pedagogy, and content" (AACTE, 2010, p.11). This model does not appear to have been adopted widely in the state's teacher preparation programs.

The variations in how these two approaches are implemented make it difficult to determine which would be most beneficial to teachers. Stand-alone courses that focus solely on instructional technology and include discussions of how to transfer the use of tools into daily practice as well as how to be a critical consumer of resources might very well serve as an excellent model. However, one barrier to this model and a significant reason programs are moving away from this approach is that it requires a separate course (typically three units), which has budget implications for students as well as the program. In the context of a severe education budget crisis, programs are looking for any avenue to save money; moving toward the integration of technology has been one approach they are adopting.

Lack of funding is also an obstacle to adopting a high-quality integration model, such as that proposed by TPACK. The integration of technology into methods courses requires a significant shift in course development and instruction on the part of faculty, many of whom are nearing the end of their careers (just like their Baby Boom K-12 counterparts). In order to effectively bring about change in their instruction, significant, ongoing and collaborative professional development needs to be provided. Yet professional development for faculty is also an area where programs are cutting funds in order to balance their increasingly lean budgets.

Individual Approach

No matter which approach has been adopted at the program level, several "islands of innovation" exist at the independent, University of California (UC) and California State University (CSU) programs across the state. This section provides examples of faculty members who have chosen to pursue more innovative approaches to the integration of technology into teacher preparation.

At the University of the Pacific, Associate Professor Heidi J. Stevenson teaches a stand-alone educational technology course entitled "Technologically Enhanced Learning Environments." The course is based on the ISTE standards described above and geared to both multiple and single subject credential candidates (mainly undergraduates). The first portion of the course emphasizes research and information fluency, digital citizenship, and communication and collaboration through discussion boards and Web 2.0 tools. In the second portion, students use creativity and critical thinking to design and develop digital learning experiences and assessments through teaching a mini-lesson integrating technology, creating a WebQuest emphasizing collaborative learning and higher-level thinking, and presenting a special topic of their choice. Such special topics have included the use of mobile technology, Audience

[4] AACTE, 2008.

Response Systems (ARS/Clickers), geocaching, SmartBoards, 3D printing, adaptive technology, and video conferencing. Looking ahead to next year, Professor Stevenson plans to modify the course to include teaching online and hybrid courses as well as developing candidates' Technological Pedagogical Content Knowledge (TPACK).

At the University of California, Davis, Rick Pomeroy and Allan Bellman, both Teacher Supervisors and Lecturers, co-teach the instructional technology course for teacher candidates earning a single subject credential. The focus of their three-unit stand-alone course is on skill-building by slowly incorporating the use of technology tools into the candidates' student teaching and then having them return to class to report out their experiences. The course teaches the use of data analysis tools, how to create digital videos as a means for reflective practice and is beginning to integrate technological modes for communicating with students and parents through websites and blogs, including the appropriate etiquette for those venues. It further encourages the use of collaboration through digital means and plans for next year include the integration of tablets, Smart Boards, clickers and social networking tools, alongside discussions of the pros, cons, and pitfalls associated with each.

At Sonoma State University, Assistant Professor Jessica K. Parker serves as an education technology and literacy specialist working with pre-service teachers earning their single subject credential. The program does not offer a stand-alone technology course as it is theoretically integrated across coursework. She recognizes the difficulty with this objective since faculty have different perspectives on how best to incorporate technology and have varying degrees of technological expertise. As a result, the single subject program has sought out partnership opportunities which have resulted in innovative experiences for faculty and teacher candidates. Sonoma State has moved to a Moodle-based learning platform which allows faculty to engage in analyses of how best to create online learning environments and support teacher candidates with lesson planning, their PACT assessment, and a program-based portfolio. Professor Parker's project incorporating geospatial tools such as Google Maps and Google Earth for use with pre-service teachers was funded by Google Education.

At California State University, Fullerton, Professor of Secondary Education Victoria Costa operates in a single-subject credential program that focuses on the development of digital skills in secondary teachers.[5] Their stand-alone course, "Technology for Secondary Teachers," is required of all single-subject candidates, and includes the development of a teacher website and a digital unit plan for use in the candidates' student teaching. The course was recently recognized by the CSU system for its high-quality online course delivery.

[5] For more details on the program, please visit the following link for a Slide Rocket presentation: http://portal.sliderocket.com/BFNWS/Digital-Teacher-Preparation-CSU-5_19_12

With a specific focus on preparing teachers to work in 21st century classrooms, their program further expects pre-service teachers to:

- increase their use of digital resources to support their own learning
- experience increased access to digital learning environments in program coursework and fieldwork
- develop expertise in the use of digital resources for K-12 instruction
- transition seamlessly between university and school technology-rich learning environments and
- model/use technologies as education, research, communication, collaboration, productivity, and utility tools.

Such ambitious program goals likewise require expectations at the university and program levels, including:

- increased access to digital resources and learning environments in university and partner schools
- increased faculty use of digital resources and learning environments
- the need to develop expertise in the use of digital resources for higher education instruction and
- the modeling of technologies as education, research, communication, collaboration, productivity, and utility tools.

CSU Fullerton began making modifications to their program in 2005 to better align with the goals stated above and have strengthened the digital components each year since.

These "snapshots" are not designed to represent an exhaustive review of the faculty and programs that reflect "islands of innovation" across California. Instead, they illustrate the types of work being done beyond the two programmatic approaches described above. Of note is the fact that the innovative work described here is largely taking place in single-subject credential programs and not in the multiple-subject programs that prepare teachers for elementary school settings — the logical place for students to begin learning how to interact with and practice using technological tools so that they may use them for projects assigned in the secondary grades.

Also of note is the fact that professors have been motivated to change their courses by the technological tools being brought to class by the teacher candidates themselves. This echoes what is taking place in K-12 classrooms where the students are bring their own tools to school. Yet this also brings up one of the challenges identified in previous CCST white papers: restrictions imposed by school- and district-level policies regulating student use of technology in the classroom. A major frustration for teacher education faculty who are inspired to integrate technology into their courses is their awareness that they are preparing teachers for an environment that may not exist in the schools where they eventually take a teaching job.

System Approach

In August 2011, Google convened the inaugural Faculty Institute, a three-day event to bring together esteemed faculty from schools of education and math and science to explore teaching paradigms that leverage technology in K-12 classrooms. The Institute's purpose was to ensure that prospective teachers' teachers have the support they need to help educators adjust to a changing landscape. At the conclusion of the three days, participants were invited to submit project proposals to carry out at their own university sites.

The California State University Digital Learning Ambassador Program, funded by Google, evolved from the Faculty Institute and seeks to transform teaching and learning frameworks within the CSU system through online technologies, with particular attention to teacher preparation. This pilot program aims to equip pre-service teachers with a better command of the free technology tools available for educators, and strengthen the exchange of best practices among CSU faculty educators in the disciplines of math, science, and education.

Though this project is less than a year old and currently limited to eight ambassadors, it is the hope of both CSU and Google that the Ambassadors' work will spread to the faculty at their own universities and eventually throughout the system, which is responsible for the preparation of approximately 60% of the state's teachers.

III. Avenues for Policy Change

A number of state-led initiatives are currently underway that could leverage and improve the state's teacher preparation programs. The California Commission on Teacher Credentialing has begun convening the Teacher Preparation Advisory Panel, whose charge is to "review the content, structure and requirements for California teacher preparation and licensure to ensure that these remain responsive to the conditions of teaching and learning in California's public schools." One issue to be covered is the implication of increased use of technology for instructional purposes. The panel is currently on hiatus due to budget cuts but expected to reconvene in the fall and produce a set of recommendations in early 2013.

In a joint effort, the California Department of Education (CDE) and Commission on Teacher Credentialing (CTC) have convened the Educator Excellence Task Force, which was called for in the Blueprint for Great Schools published by the CDE in 2011. Its charge includes "develop[ing] comprehensive recruitment, training and ***preparation frameworks*** for both new and experienced educators." The five subcommittees, one of which is focused on teacher preparation, will be submitting reports to the Task Force co-chairs at the end of June, with a final report, including recommendations, scheduled to be delivered to the CDE and CTC in the fall.

Finally, CDE has convened the Education Technology Task Force to update the state's 2005 Education Technology Plan. Part of the Task Force's mission is to "make recommendations on instructional practices for the 21st century," which inevitably will have implications for both the state's preparation and professional development systems. While recommendations to the Superintendent are anticipated to be delivered in July 2012, a period of review and public comment will follow before a final report is published.

Given the amount of time, energy and resources being invested in these three state-led initiatives, the larger conversation around the need for a state vision on digital education seems timely. Cal TAC believes they certainly represent excellent opportunities for progress but wonders ***what champions exist to pull them together so they result in a coherent, consistent state vision?***

IV. Conclusion

California clearly has much work ahead in order to prepare its teachers to adequately equip students with the skills necessary for the 21st century world. Teacher preparation programs have struggled to find the right balance in providing their candidates with critical educational technology skills in a time of extreme budget crisis and the subsequent difficult decisions regarding program priorities. In no way do we mean to minimize the challenges these programs are currently facing, yet we believe a consistent, coherent state vision around digital education could help program leaders seek out ways to prioritize the effective integration of educational technology despite the tough times.

Findings presented in this paper have motivated CCST and Cal TAC to convene a group of diverse stakeholders to identify ways to accelerate progress in the state's approach to the integration of technology in teacher preparation. In an effort to jump-start the visioning process, the upcoming CCST/Cal TAC summit will allow for opportunities to discuss the current approaches as well as the barriers and challenges to implementing change, but will primarily focus on the critical next step of creating and articulating a state vision around digital education in which to anchor efforts in both teacher preparation programs as well as the K-12 school system for which the teachers are being prepared.

As a precursor to these discussions, a sample vision for alignment and suggested actions that preparation programs can take are presented in Appendix C. It is our expectation that the summit will result in a document containing specific recommendations for consideration by education policymakers at the state, university, and local levels as work on creating a digitally enhanced public education system continues.

Appendix A

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

People in the 21st century live in a technology and media-suffused environment, marked by various characteristics, including: 1) access to an abundance of information, 2) rapid changes in technology tools, and 3) the ability to collaborate and make individual contributions on an unprecedented scale. To be effective in the 21st century, citizens and workers must be able to exhibit a range of functional and critical thinking skills related to information, media and technology.

INFORMATION LITERACY

Access and Evaluate Information

- Access information efficiently (time) and effectively (sources)
- Evaluate information critically and competently

Use and Manage Information

- Use information accurately and creatively for the issue or problem at hand
- Manage the flow of information from a wide variety of sources
- Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information

MEDIA LITERACY

Analyze Media

- Understand both how and why media messages are constructed, and for what purposes
- Examine how individuals interpret messages differently, how values and points of view are included or excluded, and how media can influence beliefs and behaviors
- Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of media

Create Media Products

- Understand and utilize the most appropriate media creation tools, characteristics and conventions
- Understand and effectively utilize the most appropriate expression and interpretations in diverse, multi-cultural environments

ICT (Information, Communications and Technology) LITERACY

Apply Technology Effectively

- Use technology as a tool to research, organize, evaluate and communicate information
- Use digital technologies (computers, PDAs, media players, GPS, etc.), communication/networking tools and social networks appropriately to access, manage, integrate, evaluate and create information to successfully function in a knowledge economy
- Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information technologies

Source: American Association of Colleges for Teacher Education. (2010). *21st Century Knowledge and Skills in Educator Preparation*. Washington, DC: Author.

Appendix B

ISTE NATIONAL EDUCATIONAL TECHNOLOGY STANDARDS (NETS) AND PERFORMANCE INDICATORS FOR TEACHERS

All classroom teachers should be prepared to meet the following standards and performance indicators.

I. TECHNOLOGY OPERATIONS AND CONCEPTS

Teachers demonstrate a sound understanding of technology operations and concepts. Teachers:

A. demonstrate introductory knowledge, skills, and understanding of concepts related to technology (as described in the ISTE *National Educational Technology Standards for Students*).

B. demonstrate continual growth in technology knowledge and skills to stay abreast of current and emerging technologies.

II. PLANNING AND DESIGNING LEARNING ENVIRONMENTS AND EXPERIENCES

Teachers plan and design effective learning environments and experiences supported by technology. Teachers:

A. design developmentally appropriate learning opportunities that apply technology-enhanced instructional strategies to support the diverse needs of learners.

B. apply current research on teaching and learning with technology when planning learning environments and experiences.

C. identify and locate technology resources and evaluate them for accuracy and suitability.

D. plan for the management of technology resources within the context of learning activities.

E. plan strategies to manage student learning in a technology-enhanced environment.

III. TEACHING, LEARNING, AND THE CURRICULUM

Teachers implement curriculum plans that include methods and strategies for applying technology to maximize student learning. Teachers:

A. facilitate technology-enhanced experiences that address content standards and student technology standards.

B. use technology to support learner-centered strategies that address the diverse needs of students.

C. apply technology to develop students' higher order skills and creativity.

D. manage student learning activities in a technology-enhanced environment.

IV. ASSESSMENT AND EVALUATION

Teachers apply technology to facilitate a variety of effective assessment and evaluation strategies. Teachers:

A. apply technology in assessing student learning of subject matter using a variety of assessment techniques.

B. use technology resources to collect and analyze data, interpret results, and communicate findings to improve instructional practice and maximize student learning.

C. apply multiple methods of evaluation to determine students' appropriate use of technology resources for learning, communication, and productivity.

V. PRODUCTIVITY AND PROFESSIONAL PRACTICE

Teachers use technology to enhance their productivity and professional practice. Teachers:

A. use technology resources to engage in ongoing professional development and lifelong learning.

B. continually evaluate and reflect on professional practice to make informed decisions regarding the use of technology in support of student learning.

C. apply technology to increase productivity.

D. use technology to communicate and collaborate with peers, parents, and the larger community in order to nurture student learning.

VI. SOCIAL, ETHICAL, LEGAL, AND HUMAN ISSUES

Teachers understand the social, ethical, legal, and human issues surrounding the use of technology in PK–12 schools and apply that understanding in practice. Teachers:

A. model and teach legal and ethical practice related to technology use.

B. apply technology resources to enable and empower learners with diverse backgrounds, characteristics, and abilities.

C. identify and use technology resources that affirm diversity.

D. promote safe and healthy use of technology resources.

E. facilitate equitable access to technology resources for all students.

Appendix C

Sample "Vision for Alignment"

P-12 system essential condition	How educator preparation programs can align	Desired outcomes for program graduates
Physical and technological infrastructure supports collaborative, project-based learning in all academic subject areas.	Current technology tools and resources are widely available and used with careful consideration to content and pedagogy as well as their effective integration.	Program graduates use technologies fluently and in pedagogically appropriate ways in all content areas, in daily practice.

Source: AACTE, 2010, p.13

How Can Educator Preparation Programs Respond?

- Establish a 21st century vision for learning environments in the program and the university.
- Ensure that the physical infrastructure supports 21st century knowledge and skills.
- Move toward flexible units of time that enable project-based work and competency-based measures of student progress.
- Ensure technical infrastructure sufficiently supports learning.
- Empower the "people network" in learning environments.

Source: AACTE, 2010, pp. 21-22.

Appendix D: References

AACTE Committee on Innovation and Technology (Ed). (2008). *The handbook of technological pedagogical content knowledge (TPCK) for educators*. New York, NY: Routledge.

American Association of Colleges for Teacher Education. (2010). *21st century knowledge and skills in educator preparation*. [Online]. Available: http://www.p21.org/storage/documents/aacte_p21_whitepaper2010.pdf

California Commission on Teacher Credentialing. (n.d.). *California's Teaching Performance Expectations*. [Online]. Available: http://www.ctc.ca.gov/educator-prep/TPA-files/TPEs-Full-Version.pdf

California Commission on Teacher Credentialing. (2008). *Induction program standards.* [Online]. Available: http://www.ctc.ca.gov/educator-prep/standards/Induction-Program-Standards.pdf

California Commission on Teacher Credentialing. (2009a). *California standards for the teaching profession.* [Online]. Available: http://www.ctc.ca.gov/educator-prep/standards/CSTP-2009.pdf

California Commission on Teacher Credentialing. (2009b). *SB 2042 Multiple subject and single subject preliminary credential program standards.* [Online]. Available: http://www.ctc.ca.gov/educator-prep/standards/AdoptedPreparationStandards.pdf

California Council on Science and Technology. (2011). *Innovate 2 Innovation: An assessment of California's innovation ecosystem (Phase II Report).* [Online]. Available: http://ccst.us/publications/2011/2011i2i-ES.pdf

International Society for Technology in Education. (2000). *National educational technology standards (NETS) and performance indicators for teachers.* [Online]. Available: http://www.iste.org/standards/nets-for-teachers.aspx

Learning Technology Center, College of Education, The University of Texas at Austin. (2010). *Redefining teacher education for digital-age learners: A call to action.* [Online]. Available: http://redefineteachered.org/sites/default/files/SummitReport.pdf?q=summitreport

Project Tomorrow. (2010). *Unleashing the future: Educators "speak up" about the use of emerging technologies for learning.* [Online]. Available: http://www.tomorrow.org/speakup/pdfs/SU09UnleashingTheFuture.pdf

The Milken Exchange & the International Society for Technology in Education. (1999). *Will new teachers be prepared to teach in a digital age?* [Online]. Available: http://mff.org/publications/publications.taf?page=154